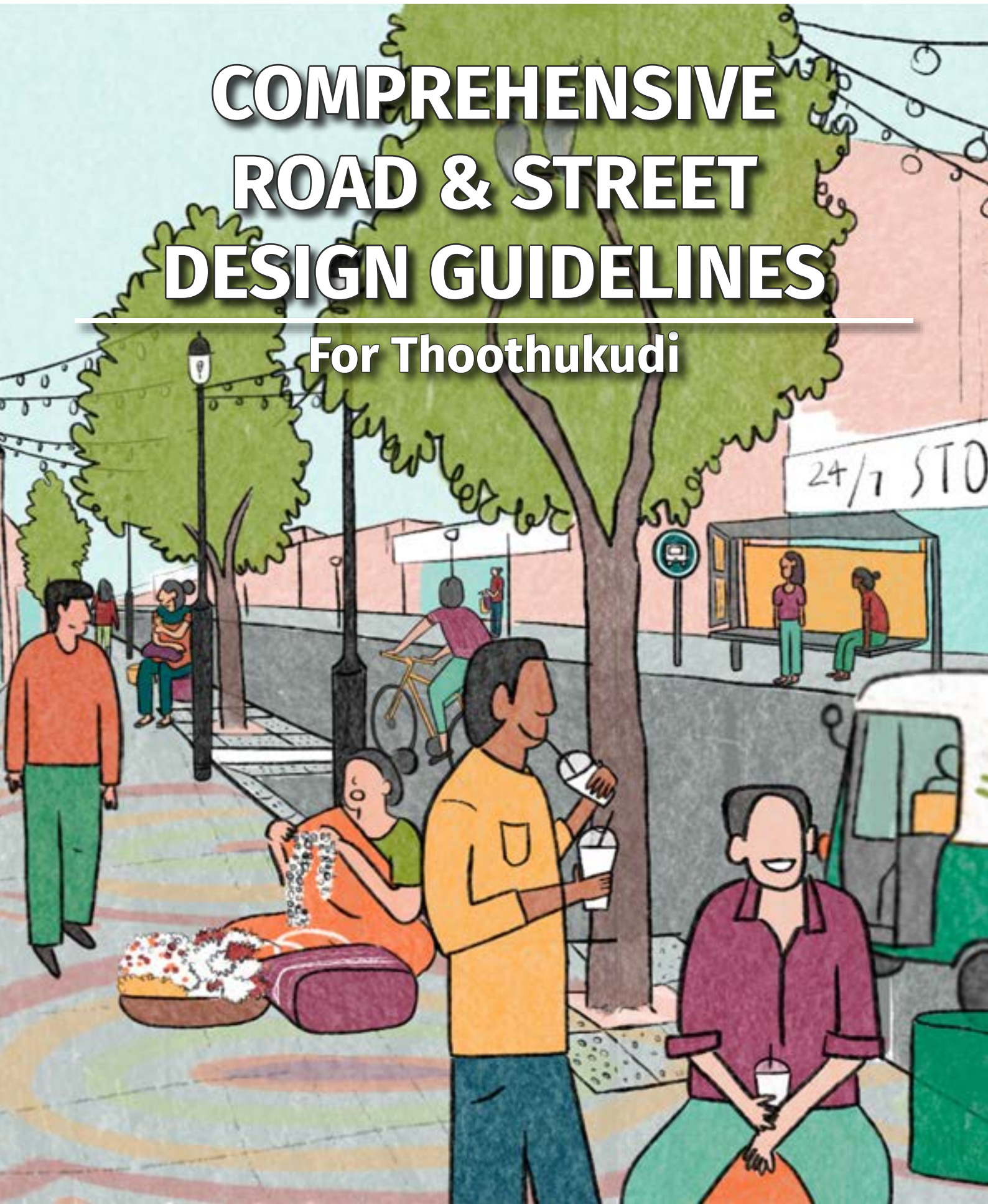


COMPREHENSIVE ROAD & STREET DESIGN GUIDELINES

For Thoothukudi



Acknowledgements



The Municipal Administration and Water Supply (MAWS) Department, Government of Tamil Nadu is responsible for policy formulation, planning, and oversight of Urban Local Bodies, including Municipal Corporations, Municipalities, and Town Panchayats. The department guides and funds urban services such as roads and street infrastructure, water supply, sewerage, storm-water drainage, solid waste management, and street lighting, while also coordinating implementation of state and centrally sponsored urban programmes to improve service delivery and urban governance.



The Thoothukudi City Municipal Corporation (TCMC) is the civic body governing the city of Thoothukudi in Tamil Nadu, India. It was initially constituted as a municipality in 1866 and upgraded to a municipal corporation on 5 August 2008 due to rapid population growth and urban expansion. Today, the City Municipal Corporation administers an area of 90.66 sq km, divided into 60 wards across four zones. The governance structure includes an elected Mayor, Deputy Mayor, and a Municipal Commissioner heading the administration.



UK Partnering for Accelerated Climate Transitions (UK PACT) is a programme funded by the UK Government. UK PACT supports countries that strive to overcome barriers to clean growth and have high emissions reduction potential to accelerate their climate change mitigation efforts. The programme funds projects which support partner countries to implement and increase their ambitions for carbon emissions reductions in line with their Nationally Determined Contributions (NDC). All UK PACT projects work to accelerate partner countries' transition to low carbon development. UK PACT delivers impact through a combination of funding longer-term capacity building projects and the rapid mobilisation of expertise.



The Institute for Transportation & Development Policy (ITDP) is a global non-for-profit organisation that works with cities worldwide to promote transport solutions that reduce traffic congestion, air pollution, and greenhouse emissions while improving urban liveability and economic opportunity. ITDP is represented in India by ITDP Pvt Ltd and works with governments, multilateral agencies, and civil society to make visible, on-the-ground improvements by providing technical expertise, policy solutions, research publications, and training programmes.

June 2026



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All photographs & graphics by ITDP, unless mentioned otherwise

This document is a city specific adaptation of the Healthy Streets Design Workbook launched in 2024 by the Ministry of Housing and Urban Affairs and Comprehensive Roads and Street Design Guidelines for Chennai Metropolitan Area.

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Pondy bazaar, Chennai

About the Guideline

Historically, Roads & Streets served the purposes of mobility, social interaction, and commerce. However, in recent times, their role has been reduced to conduits for the movement of motor vehicles, paying little or no attention to other users—pedestrians, cyclists, people doing business, and more. This vehicle-centred approach to planning and designing Roads & Streets has led to multiple consequences, such as traffic congestion, parking issues, increasing pollution, and rising road accidents. Evidently, people also face adverse impacts on their health, well-being, and safety in our cities today.

There is an urgent need to re-imagine Roads & Streets not only as pathways for movement across the city but also as places where people walk, cycle, shop, and engage in a multitude of social functions that are critical to the health of cities and their citizens. Such roads & streets are a strong indicator of a developed and equitable society.

Across Thoothukudi, there is growing momentum to design roads & streets that prioritise pedestrians and public transport users. As more roads & streets are envisioned to be transformed, a common set of guidelines is imperative to inform and direct the design process.

Complete Roads & streets are where everyone—be it an eight-year-old or an eighty-year-old—can move safely, comfortably, and breathe clean air. The Comprehensive Roads & streets Design Guideline elaborates on:

- Key principles that define a Complete Roads & street
- The process of designing Complete Roads & streets
- Design guidelines and standards
- Roads & street cross-section templates
- Material palette

Applicability of the Document The Comprehensive Roads & streets Design Guideline is intended for various stakeholders in urban roads & street planning, including government authorities responsible for city and municipal planning, road owning and implementing agencies maintaining and executing roads & street projects, and consultants and practitioners such as urban designers, architects, planners, and engineers, public transport operators and mobility agencies, and other authorities involved in policy and development. It also serves researchers and students studying urban design and planning.

The guidelines mentioned in this document are applicable to all urban roads, including highways and express-ways within the Thoothukudi Local Planning Area—Thoothukudi LPA includes the Thoothukudi Corporation, three Panchayat Unions, and 32 Village Panchayats. The respective road owning agencies shall transfer their implementation rights to the Urban Local Bodies for better integration. Until such transfer occurs, pedestrian safety measures outlined in this document must be adhered to.

Implementing Authorities Thoothukudi City Municipal Corporation, Highways and Minor Ports Department, National Highways Authority of India (NHAI), and Other ULBs.

Other Authorities to be Involved Directorate of Town and Country Planning (DTCP), Tamil Nadu State Transport Corporation (TNSTC), Indian Railways (Southern Railways), Police Departments, Utilities Department (TWAD, TNEB), Water Resource Department (WRD).

Throughout this document, the term 'Thoothukudi' refers to the Thoothukudi City Municipal Corporation Area



Pondy bazaar, Chennai

List of Acronyms

Acronyms	Abbreviations
ADB	Asian Development Bank
BoQ	Bill of Quantities
BRR	Bus Route Roads
BRTS	Bus Rapid Transit System
BSCL	Bhubaneshwar Smart City Limited
BvLF	Bernard van Leer Foundation
CATV	Community Antenna Television
CSO	Civil Society Organisation
DIP	Ductile Iron Pipe
DTCP	Directorate of Town and Country Planning
ECS	Equivalent Car Space
EV	Electric Vehicle
FRP	Fibre-Reinforced Polymer
GFC	Good For Construction
GI	Galvanised iron
HCV	Heavy Commercial Vehicles
HDPE	High-Density Polyethylene
HT	High Tension
IPT	Intermediate Public Transport
IRC	Indian Road Congress
ITC	Infant, Toddler and Care-Givers
JICA	Japan International Cooperation Agency
LAP	Local Area Plan
LCV	Light Commercial Vehicle
LED	Light Emitting Diode
LMIC	Low and Middle Income Countries
LPA	Local Planning Authority
LT	Low Tension
Lvl	Level
TCMC	Thoothukudi City Municipal Corporation
MOHUA	Ministry of Housing and Urban Affairs
MoRTH	Ministry of Road Transport & Highways

Acronyms	Abbreviations
MRTS	Mass Rapid Transit System
MS	Mild Steel
SEC	Street Elements Corridor
NACTO	National Association of City Transportation Officials
NIUA	National Institute of Urban Affairs
NMT	Non-Motorised Transport
OFC	Optical Fibre Cable
PCC	Plain Cement Concrete
PIS	Passenger Information System
PMC	Pune Municipal Corporation
PVC	Polyvinyl Chloride
RCC	Reinforced Concrete Cement
RfP	Request for Proposal
RMU	Ring Main Unit
RoW	Right-of-Way
RWA	Residential Welfare Association
SEC	Street Elements Corridor
SS	Stainless Steel
SUV	Sport Utility Vehicle
TOD	Transit Oriented Development
ToR	Terms of Reference
TPS	Town Planning Scheme
TU	Tactical Urbanism
ULB	Urban Local Body
UNCRPD	United Nations Convention on the Rights of Persons with Disabilities
UTTIPEC	The Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre
VRU	Vulnerable Road Users



Harrington Road, Chennai

1

Introduction

- 1.1. Urban Mobility Scenario of Thoothukudi
- 1.2. Best Practises from Indian and International Cities
- 1.3. Vision and Goals

1.1 Urban Mobility Scenario of Thoothukudi

The Thoothukudi Local Planning Area (LPA) spans approximately 463.61 sq. km and comprises the Thoothukudi City Municipal Corporation (TCMC) functioning as the region's primary urban centre spanning 90.66 sq.km along with 34 surrounding revenue villages. According to the 2011 Census, the Local Planning Area had a population of 5.14 lakhs of which 372,408 residents (72.4%) lived within the Corporation limits and 141,905 residents (27.6%) resided in the surrounding planning area. The LPA reflects a unique coastal-urban and industrial character, shaped by the presence of the V.O. Chidambaranar (VOC) Port, industrial estates, fisheries, salt pans, and rapidly urbanising peripheral settlements.

1.1.1 Modal Split in LPA (2025)

Within the Thoothukudi LPA, two-wheelers (61%) followed by four-wheelers (21%) dominate daily trips while buses/mini buses (5%) combined with IPT (3%) maintain a notably low share of 8%. Given Thoothukudi's status as a major port hub, the freight segment shares an aggregate modal share of 9%. A concerning decline is seen in the sustainability mode share with cycling only amounting to 1% of the mode share. Walking continues to play a critical role as first- and last-mile access to buses, with arterials near bus terminals witnessing peaks of pedestrian volumes reaching 700 pedestrian per hour highlighting the need to prioritise safe, comfortable pedestrian and cycling infrastructure to sustain public transport use and rebalance street space.



Source : Thoothukudi Master plan, 2045

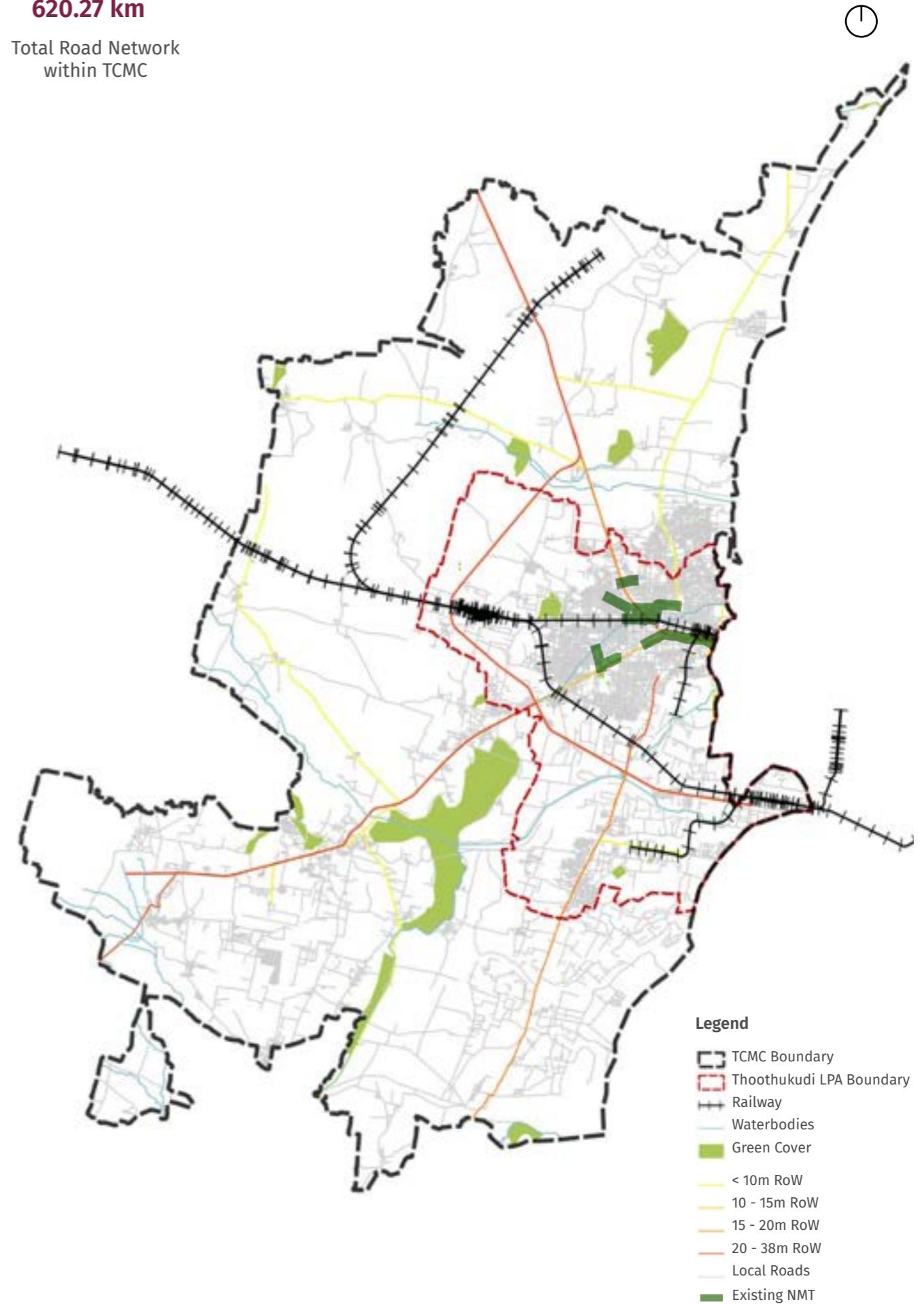


Image Source: Flickr

1.1.2 Thoothukudi's Urban Road Network

620.27 km

Total Road Network within TCMC

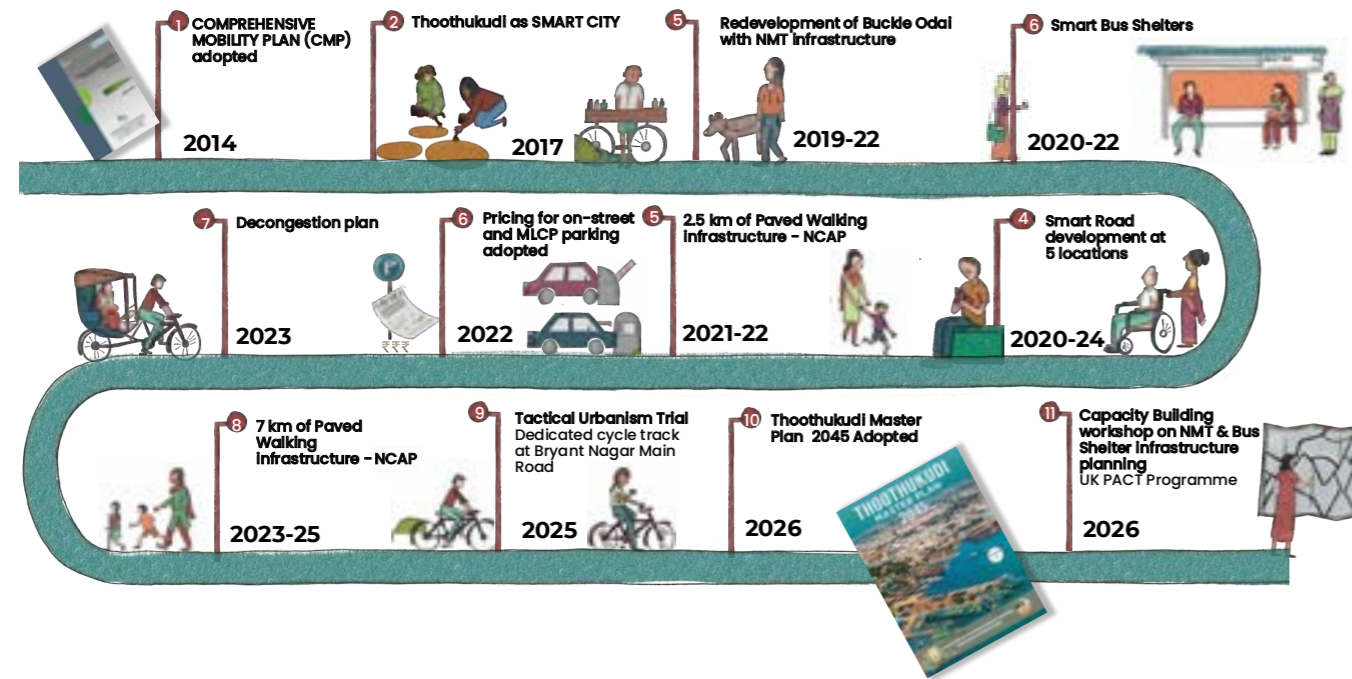


Source: Master Plan 2045 & TCMC

1.1.3 Journey towards NMT

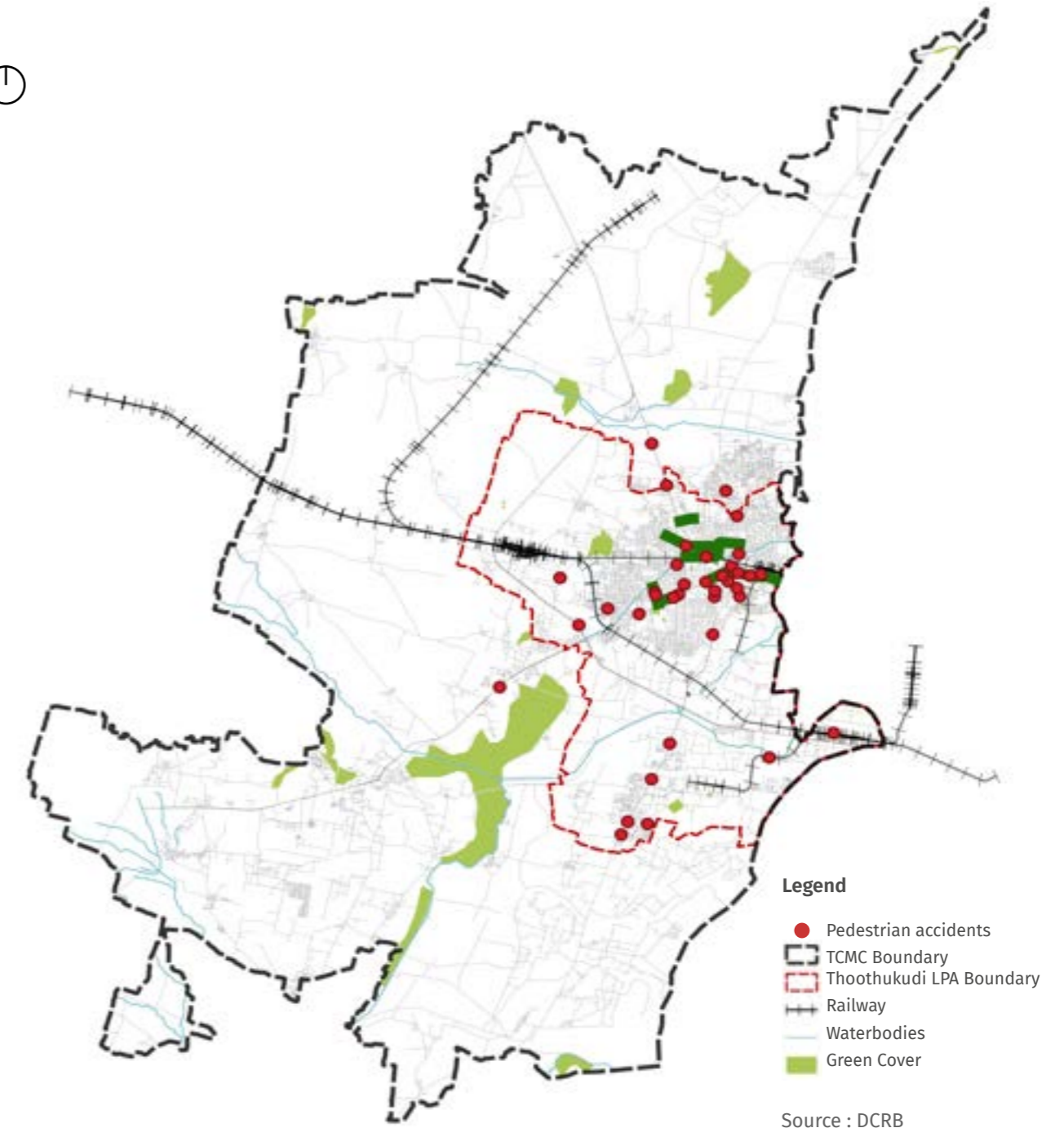
Thoothukudi has historically been a walk- and cycle-oriented city, with the Comprehensive Mobility Plan (CMP), 2014, highlighting a 47% modal share of walking trips and 12% cycling trips, supported by short trip lengths, mixed land use, and high pedestrian activity, especially in the city core. In the last decade, however, rising ownership of two-wheelers and private vehicles has shifted travel patterns towards vehicle-driven mobility, reducing safety and comfort for pedestrians and cyclists.

In response, Thoothukudi has begun to re-prioritise non-motorised transport through, selective footpath and cycling improvements under the National Clean Air Programme, parking management measures, smart roads, bus shelters and other public realm projects under the Smart Cities Mission. The Comprehensive Mobility Plan and Thoothukudi Master Plan reinforce this shift, positioning walking and cycling as essential to urban mobility. The city is now at a critical transition, balancing growing motorisation with renewed efforts to strengthen walkability and cycling.



1.1.4 Road Safety Scenario of Thoothukudi

7671 Total Road Accidents (2017-2025)
2455 Total Road Fatalities (2017-2025)



Despite key investments including Smart Road upgrades in the ABD area and pedestrian infrastructure provisions under NCAP, NMT infrastructure in Thoothukudi remains spatially fragmented. On key arterials such as VE Road, Thamizh Salai, and Tiruchendur Road, discontinuous footpaths, utility obstructions, and vendor encroachments routinely force pedestrians onto the carriageway. Unorganised on-street parking, IPT operations, and informal freight halting along commercial corridors and port access routes further narrow effective carriageway width and eliminate NMT buffer space. In the core commercial streets of Palayamkottai Road and West Great Cotton Road, already operating as one-way streets, two-wheeler and truck parking erodes usable road space in the absence of dedicated footpaths or cycle tracks. Within Thoothukudi, 744 crashes were recorded from January-June of 2025, of which 42 were pedestrian fatalities.

The quality of infrastructure for pedestrians is currently faces several setbacks that include lack of proper maintenance and quality of construction, inadequate size, poor or missing crossing infrastructure, encroachments of walkways and a lack of way-finding signages and road markings.



Parking encroachments



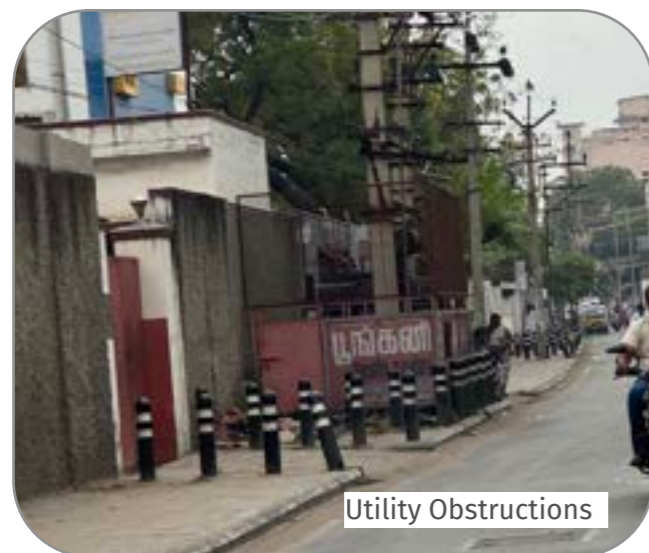
Lack of wayfinding & signage



Lack of waiting spaces for buses



Unsafe crossings



Utility Obstructions



Lack of universal accessibility measures

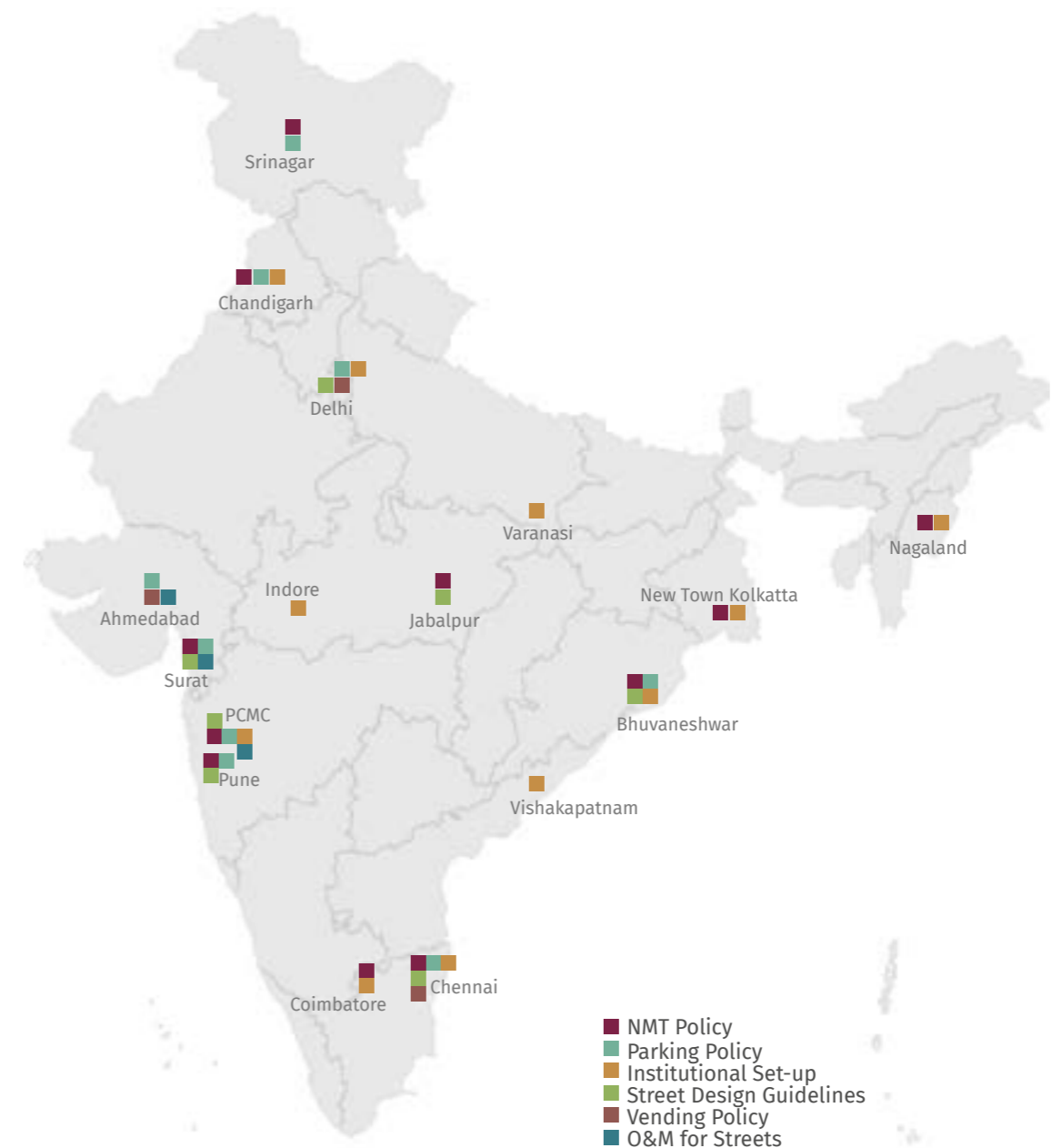
To prevent a shift toward a car-dependent, high-carbon mobility pattern, and to support existing and future non-motorised transport (NMT) demand the city must invest in a comprehensive, high-quality network of pedestrian and cycling infrastructure, with particular attention to safe intersection design.

1.2 Best Practises from Indian and International Cities

The best practices presented in this section draw on successful policy-making, guidelines, street design, planning, and implementation approaches adopted in leading Indian and international cities. They illustrate how people-first principles, context-sensitive design, and coordinated governance can transform streets into safe, accessible, and vibrant public spaces. These practices serve as reference models to guide cities in delivering high-quality streets that prioritise walking, cycling, public transport, and inclusive urban mobility.

1.2.1 Status of Indian Cities in Foundational Measures

Fifteen Indian cities — Ajmer, Bhopal, Chandigarh, Gangtok, Indore, Jhansi, Kochi, Kohima, Nagpur, New Town Kolkata, Pimpri Chinchwad, Rourkela, Sagar, Silvassa, and Ujjain — have formally adopted Healthy Streets Policies, setting a strong precedent for people-centric street design across the country. In parallel, several cities, including Bhubaneswar, Pune, Delhi, Chennai, and Bengaluru, have developed their own Street Design Guidelines that align with the Healthy Streets framework, promoting safe, inclusive, and sustainable urban mobility.



1.2.2 Case Studies from Indian Cities

City	Key Street Design Initiatives	Lead Agencies
Delhi	<ul style="list-style-type: none"> Complete Streets under Delhi Master Plan 2041 Redevelopment of Chandni Chowk pedestrian zone Smart City area street redesign (NDMC) 	DDA, PWD, NDMC, Smart City SPV
Mumbai	<ul style="list-style-type: none"> Mumbai Street Design Manual Pedestrian-friendly Kalanagar Junction redesign LOTUS initiative streets Bandra, Dadar, Andheri road improvements (MMRDA) Coastal Road pedestrian realm improvements 	MCGM/BMC, MMRDA, Mumbai Traffic Police
Bengaluru	<ul style="list-style-type: none"> Tender SURE projects Smart Streets under Bengaluru Smart City Church Street pedestrianisation 	DULT, BBMP, Bengaluru Smart City
Hyderabad	<ul style="list-style-type: none"> Strategic Road Development Programme (SRDP) streetscape Charminar Pedestrianisation Project (CPP) Lakefront access improvement (Hussain Sagar) 	GHMC, HMDA, Hyderabad Smart City
Ahmedabad	<ul style="list-style-type: none"> Complete Streets under Smart City Mission Janmarg BRT corridor public realm improvements Riverfront road pedestrian & cycle improvements Manek Chowk pedestrianisation 	AMC, AUDA, Ahmedabad Smart City
Chennai	<ul style="list-style-type: none"> Chennai Complete Streets Programme T Nagar Pedestrian Plaza 200km of Bus Route Roads Development Safe Access to Schools (CUMTA-ITDP) 	GCC, CUMTA, ITDP, Chennai Smart City
Coimbatore	<ul style="list-style-type: none"> Model Roads by Smart City (Race Course, DB Road, NSR Road) Lakeside public realm improvements 	CCMC, Coimbatore Smart City, GIZ
Mizoram (Aizawl)	<ul style="list-style-type: none"> NMT and hillside street redesign pilots Pedestrian safety improvements in steep terrains Smart City pedestrian plazas 	Aizawl Smart City, UD&PA
Pune	<ul style="list-style-type: none"> Pune Cycle Plan (200 km network) & bicycle tracks Complete Streets guidelines Jangli Maharaj & Fergusson College Road redesign Riverfront street improvements 	PMC, Pune Smart City, PMPML
PCMC (Pimpri-Chinchwad)	<ul style="list-style-type: none"> Nashik Phata-Wakad BRT corridor streetscape Linear Garden 	PCMC, Smart City SPV
Indore	<ul style="list-style-type: none"> Rajwada Pedestrian Zone NMT streets under Smart City (AB Road zone) Riverfront streetscape 	IMC, Indore Smart City
Kochi	<ul style="list-style-type: none"> Kochi Water Metro access streets MG Road and Marine Drive pedestrian improvement Fort Kochi heritage street upgrades 	Kochi Smart City, KMC, KMRL
Chandigarh	<ul style="list-style-type: none"> Sector 17 Plaza pedestrianisation & public realm upgrade V2/V3 road corridor streetscape enhancement under Smart City Mission Cycle tracks and greenway improvements across sectors Jan Marg & Capitol Complex pedestrian access upgrades 	Chandigarh Smart City Ltd (CSCL), CAMC Chandigarh, UT Transport Dept
New Town, Kolkata	<ul style="list-style-type: none"> Complete Streets initiative across Action Area I, II & III 120 km+ dedicated cycle network with bike-sharing integration Public realm improvements around Eco Park, Mother's Wax Museum, Biswa Bangla Gate 	NKDA, HIDCO, Kolkata Police, Smart City Mission

City	Key Street Design Initiatives	Lead Agencies
Kolkata	<ul style="list-style-type: none"> East-West Metro corridor streetscape improvements Park Street pedestrian-friendly redesign (pilot events & temporary pedestrianisation) Kolkata Riverfront access improvements 	KMC, NKDA, KMDA, Kolkata Police
Lucknow	<ul style="list-style-type: none"> Hazratganj pedestrian zone & heritage streetscape Gomti Riverfront public realm improvements Janeshwar Mishra Park access roads redesign 	LDA, LMC, Lucknow Smart City
Bhubaneswar	<ul style="list-style-type: none"> Bhubaneswar Street Design Manual Smart District Complete Streets (Janpath, Saheed Nagar) Ekamra Kshetra heritage streets & pedestrianisation 	BDA, BMC, Bhubaneswar Smart City Ltd (BSCL)
Srinagar	<ul style="list-style-type: none"> Dal Lakefront promenade and street redesign Polo View Market pedestrianisation Smart City streetscape projects (Lal Chowk) 	SMC, Srinagar Smart City Ltd, SDA

1.3.3 Case Studies from International Cities

City	Key Street Design Initiatives	Lead Agencies
New York City, USA	<ul style="list-style-type: none"> Times Square pedestrianisation NYC Street Design Manual Vision Zero complete streets Protected bike lane network expansion 	NYC DOT, Mayor's Office
London, UK	<ul style="list-style-type: none"> Healthy Streets Approach Oxford Street transformation Cycle Superhighways Low-Traffic Neighbourhoods (LTNs) 	Transport for London (TfL), Borough Councils
Paris, France	<ul style="list-style-type: none"> Champs-Élysées pedestrianisation plan "15-Minute City" policy Seine riverbank pedestrian zone 1,000 km+ bike lane expansion 	Paris City Council, APUR
Copenhagen, Denmark	<ul style="list-style-type: none"> Strøget car-free streets Green Wave cycling corridors Superkilen public space redesign 	City of Copenhagen, Realdania
Barcelona, Spain	<ul style="list-style-type: none"> Superblocks (Superilles) model La Rambla redesign 	Barcelona City Council, Area Metropolitana de Barcelona
Singapore	<ul style="list-style-type: none"> Orchard Street Car-Lite Districts (Marina Bay, Punggol) Park Connector Network (PCN) Transit-Oriented street design 	LTA, URA
Melbourne, Australia	<ul style="list-style-type: none"> Little Streets pedestrian priority Urban Forest & green street programme Docklands & CBD streetscape renewal Cycling network expansion 	City of Melbourne
Tokyo, Japan	<ul style="list-style-type: none"> Shared Streets in Ginza (pedestrian-only weekends) "Green Road" neighbourhood paths Station-area public realm upgrades 	Tokyo Metropolitan Govt
Bogotá, Colombia	<ul style="list-style-type: none"> Ciclovía (world's largest open streets) TransMilenio BRT corridor streetscape Plazas and pedestrian improvements in CBD 	City of Bogotá
Seoul, South Korea	<ul style="list-style-type: none"> Cheonggyecheon stream restoration Seoul Station pedestrian plaza Car-free zones in Jongno Superblocks around schools 	Seoul Metropolitan Govt



CSIR road, Chennai

1.3 Vision and Goals

Despite several street improvement projects, Thoothukudi continues to face fragmented planning, inconsistent design standards, rampant footpath encroachment and inadequate pedestrian & cycling infrastructure. Without a unified framework, multiple agencies implement uncoordinated interventions that compromise safety, accessibility, and long-term maintenance. With rising congestion, air pollution, and road fatalities—a strong NMT vision is essential. Prioritising walking and cycling reduces car dependency, strengthens last-mile connectivity, improves public health and air quality, and helps build a more resilient, inclusive, and people-centric Thoothukudi.

1.3.1 Vision Statement



To create people-centred, well-connected Complete Streets that make walking, cycling, and public transport seamless, while offering safe, inclusive & pleasant public spaces that nurture community life and local commerce.



1.3.2 Goals

1

Improve NMT network around transit stations, schools, key facilities and high accident spots

2

Develop NMT network along blue green infrastructure

3

Provide safe streets and crossings

4

Ensure well-maintained and encroachment-free footpath

5

Integrate utility implementation with footpath

6

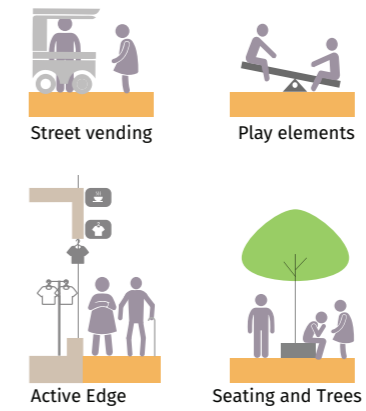
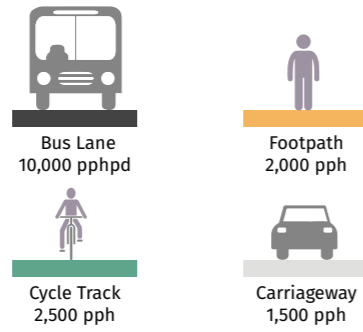
Ensure all roads/ streets have green canopy



Harrington Road, Chennai

Efficient mobility

Complete roads & street ensures efficient mobility by offering multiple modes of travel, especially high-quality facilities for public and non-motorised transport. With greater capacity, complete roads & street moves more people by allocating space equitably for all users, rather than prioritising only private motor vehicles.

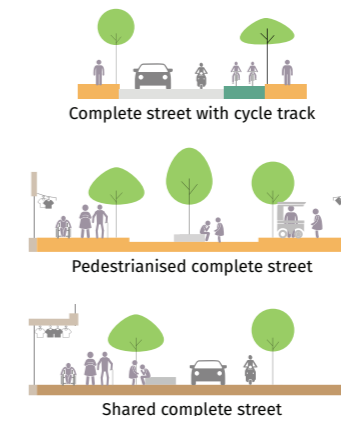
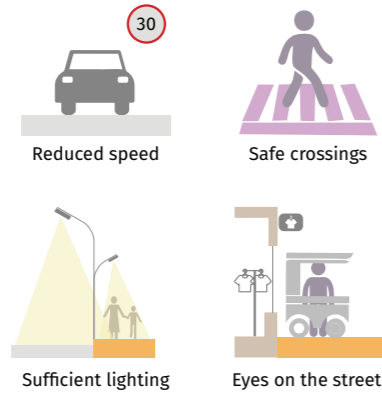


Liveability

A complete road & street is full of life, with elements that improve activity. Improved liveability improves conditions for existing users, attracts more users, increases retail activity and transforms the roads & streets into a vital public space.

Safety

A complete road & street is safe for all user groups by providing segregated spaces for each and incorporating traffic calming measures. Complete roads & streets ensure personal safety as well, with good lighting and 'eyes on the roads & streets' through active edges and vending.

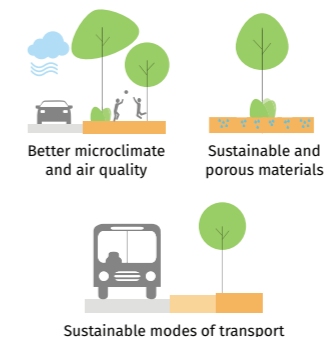
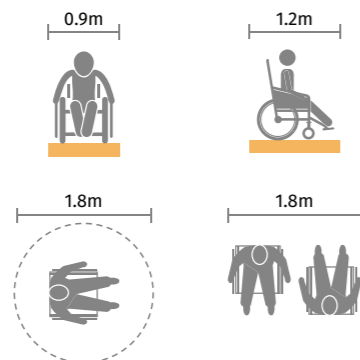


Sensitivity to local context

A complete road & street is designed to suit the local context, factoring in local street activities, pedestrian movement patterns, nearby land uses, and the needs of the people. Design interventions can range from elements added to the street to street-level interventions like shared or pedestrianised streets.

Universal accessibility

Complete roads & streets should be accessible to all, including people with disabilities. Continuous, even-surfaced footpaths, table-top crossings, ramps, and tactile pavers wherever level differences occur are some measures to ensure universal accessibility.



Environmental sustainability

Complete roads & street promotes sustainable modes of transport and have the scope to improve local climatic conditions. Trees and plants on roads & streets help absorb pollutants and reduce heat. Well-designed, complete roads & streets also help properly capture and channelise rainwater.



2

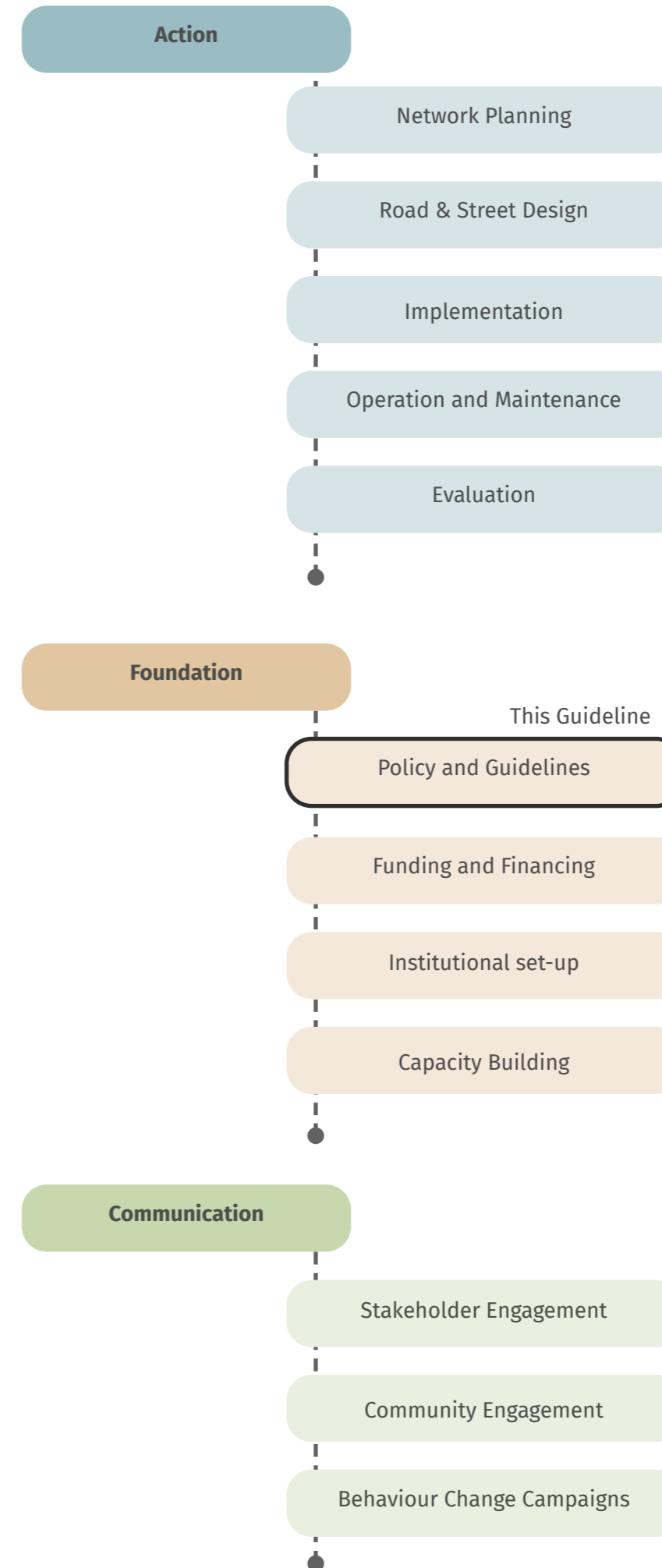
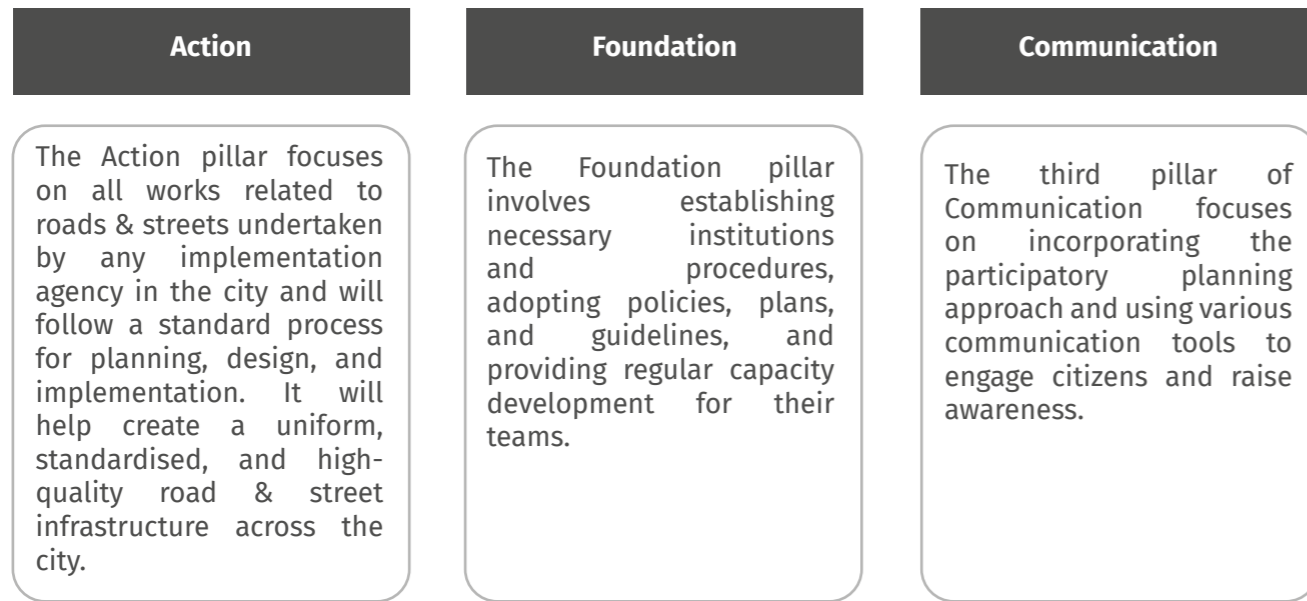
Comprehensive Roads & Street Planning and Design

- 2.1. Complete Road & Street Approach
- 2.2. How to plan a Comprehensive Roads & Street Network?
- 2.3. What is a Complete Road & Street?
- 2.4. Children and Streets

2.1 Complete Road & Street Approach

Complete roads and streets can be achieved by adopting various measures structured under a 3-Pillar Strategy—Action, Foundation, and Communications. These steps will help to make walking, cycling, and public transport attractive across the city.

2.1.1 Three-Pillar Strategy



2.2 How to plan a Comprehensive Roads & Street Network?

A Street network is an interconnected system of urban roads & streets designed to prioritise the well-being of users, promoting walking, cycling, and other non-motorised modes of transport. This can be achieved by ensuring that people have access to all necessities within a 15-minute travel time. It requires integrating the city's development with the transport systems. Cities can create such networks through city- or area-level Non-Motorised Transport (NMT) plans and Bicycle plans, which involve designing dedicated lanes, pedestrian-friendly zones, and efficient connectivity to encourage active transportation and reduce reliance on motorised vehicles.

2.2.1 Integrating Complete Road & Street Network Plan with Statutory Planning Processes

The road & street network plan should be integrated into statutory frameworks such as the Master Plan, Local Area Plans, and CMP to ensure long-term sustainability. Embedding it in development regulations will mandate pedestrian-friendly infrastructure, while aligning it with parking and traffic management plans will support effective implementation.

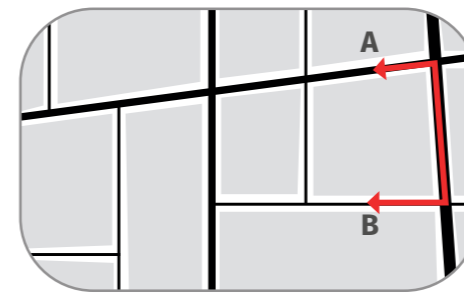
A. Standardising Right-of-Ways for Road/Street Network Development (Ref Chapter 3 for detailed templates)

Category	RoW	No of Lanes	Footpath	Cycle Track	Tree Corridor	Median	Service Lane	BPL/ BRTS	Metro	Street Elements Corridor (SEC)	Parking
Arterial	60m	8	✓		✓	✓	✓	✓		✓	✓
Arterial	60m	6	✓	✓	✓	✓	✓		✓	✓	✓
Arterial	45m	6	✓		✓	✓	✓	✓		✓	✓
Arterial	45m	4	✓	✓	✓	✓	✓		✓	✓	✓
Sub-arterial	36m	6	✓		✓	✓		✓		✓	✓
Sub-arterial	36m	4	✓	✓	✓	✓		✓	✓	✓	✓
Sub-arterial	30m	4	✓		✓	✓		✓	✓	✓	✓
Sub-arterial	30m	4	✓		✓	✓			✓	✓	✓
Sub-arterial	30m	4	✓	✓	✓	✓				✓	✓
Collector	24m	4	✓		✓	✓				✓	✓
Collector	24m	2	✓	✓	✓					✓	✓
Collector	18m	2	✓		✓					✓	✓
Local	12m	2	✓		✓						
Local	9m	2	✓							✓	

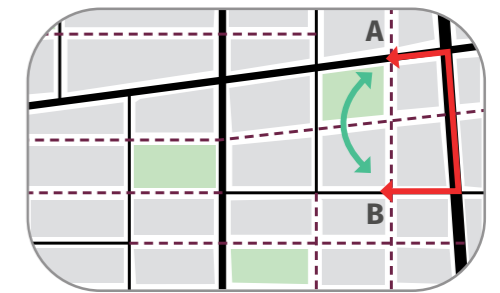
- Grids of Roads plan has to be developed by the development authorities as part of the statutory planning process.
- The plan shall cover all arterial, sub-arterial and collector roads (upto RoW of 18m).
- The proposed hierarchy of roads are to be developed/implemented by the development authority through Town Planning Schemes (TPS)/ Land pooling Schemes (LPS), Transferable Development Rights (TDR) or land acquisition etc.
- Local streets (12m and 9m) are to be developed by development authorities/ Roads Owning Agencies/ private developers.
- Any roads above 12m RoW proposed in Grid of Roads plan that cuts across any proposed layouts necessary TDR compensation shall be provided as per extent TDR rules

B. Planning for Complete Road & Street Network in Greenfield Development

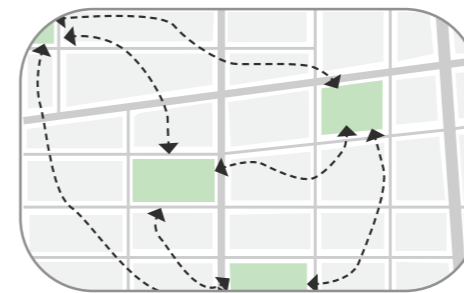
A road & street Network in greenfield developments ensures seamless connectivity, walkability, and transit integration. Town Planning (TP)/ Land Pooling schemes are a practical example of structured network planning in greenfield developments



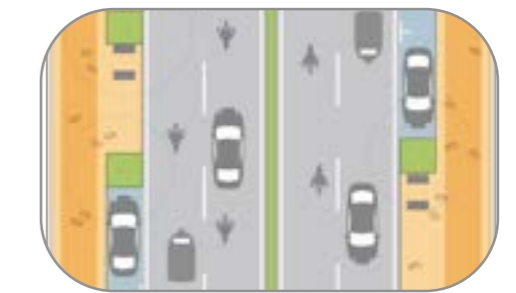
Establish Grid of Roads Network implementing standard Right-of-Ways



Create Smaller Block Sizes



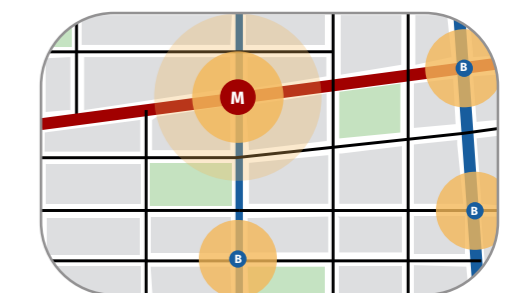
Develop an Integrated Open Space Network



Adopt the Complete road & street Approach



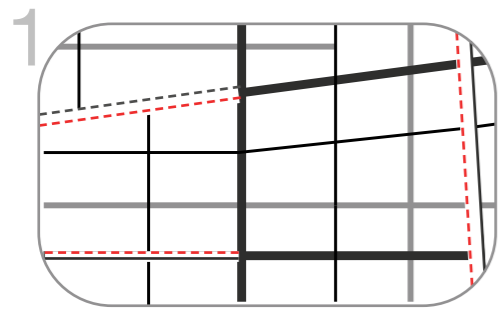
Create Traffic Management Plans



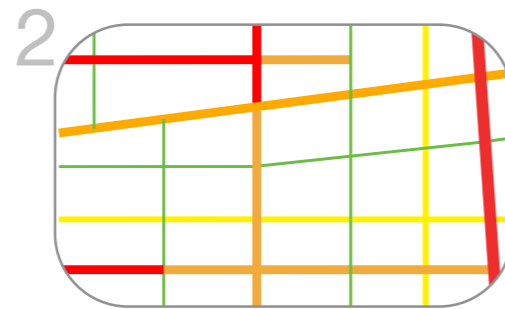
Implement Transit-Oriented Development (TOD)

C. Planning for Complete Road & Street Network in Brownfield Development

Brownfield development should prioritise a well-connected street network by implementing Local Area Plans (LAPs) to create smaller, walkable blocks. Streets must be upgraded by identifying gaps in footpaths and cycling infrastructure, ensuring necessary repairs, and enhancing pedestrian and cycling facilities. Improving connectivity through missing links, intersection upgrades, and re-purposing underutilised spaces will strengthen mobility.



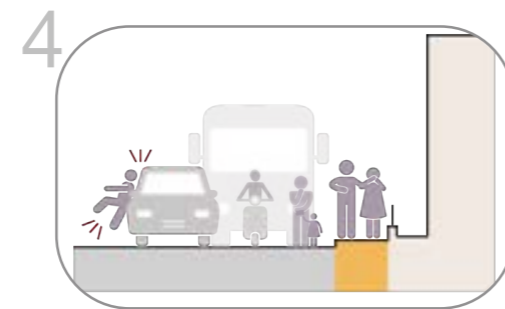
1 Identify the existing road hierarchy for the city and develop desired hierarchy as mentioned (2.2.1 A)



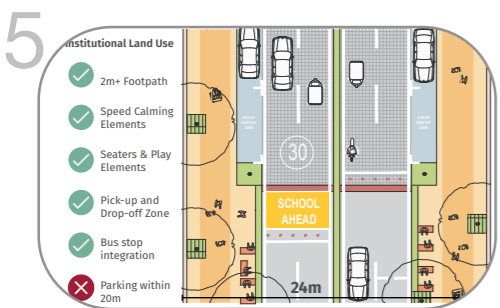
2 Map the desired speeds of the network based on the road hierarchy - this will help identify the level of traffic calming interventions



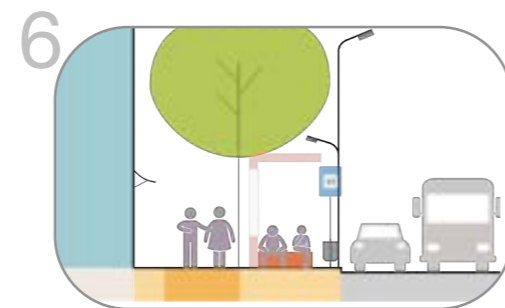
3 Prioritize streets that improve accessibility to transit stations, educational institutions, areas of work, commercial destinations, parks, and other open spaces.



4 Identify streets that witness high pedestrian crashes



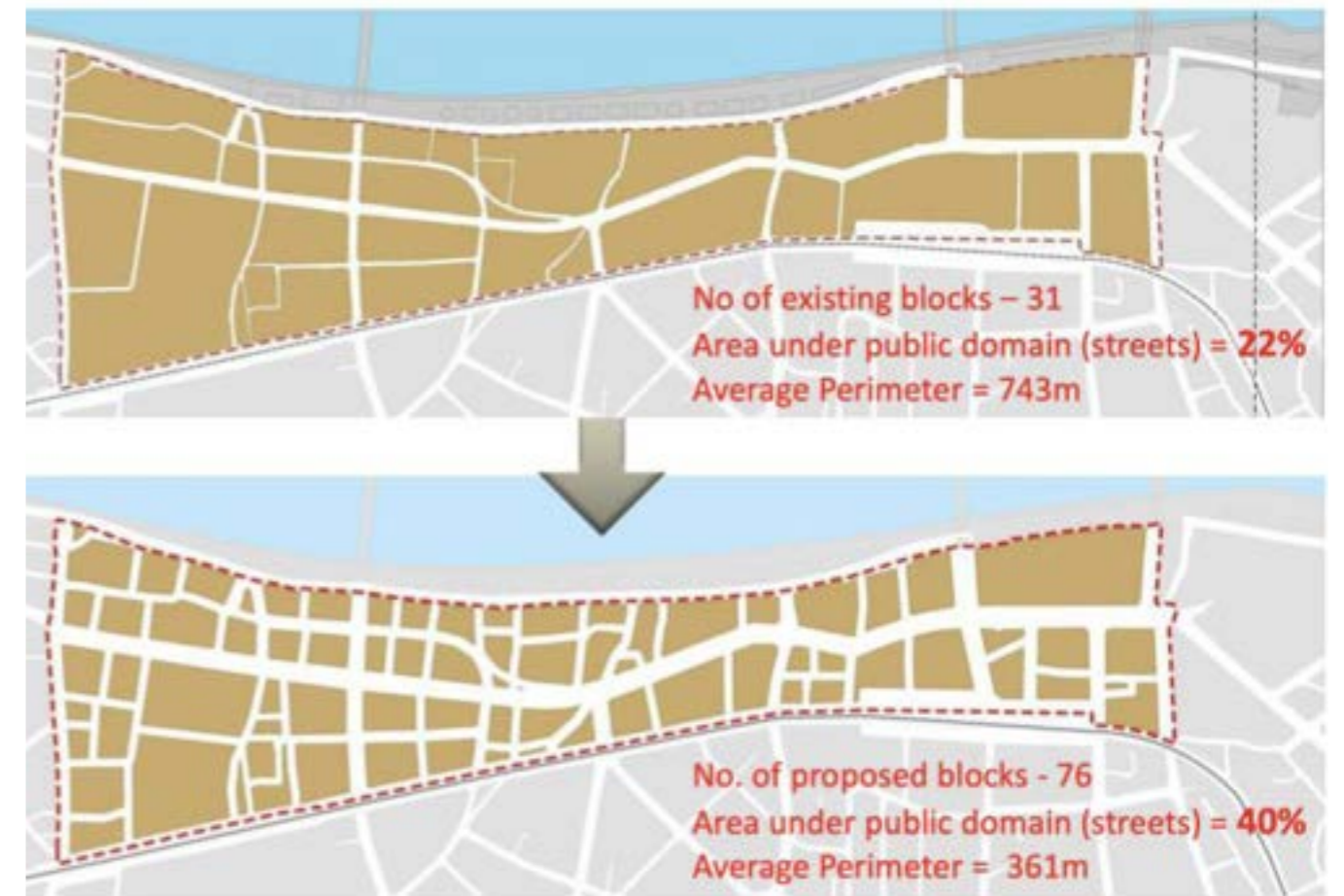
5 Design roads & streets as per RoW and adopt the respective Template



6 Refine the type of infrastructure based on the local context and implement TOD Eg: if the street has high footfall, it can be made a NMT only street.

Refer IRC:SP:118 and Network planning guide for more details on how to plan and evaluate a Street Network.

Creating small blocks in a Brownfield Scenario



Source: HCPDPM, Ahmedabad - LAP 1

Compact blocks can be created in brownfield areas through Local Area Plans. Planning exercises should consider potential redevelopment, plot ownership, street widths, and land use.

Compact networks in brownfield areas can be achieved by:

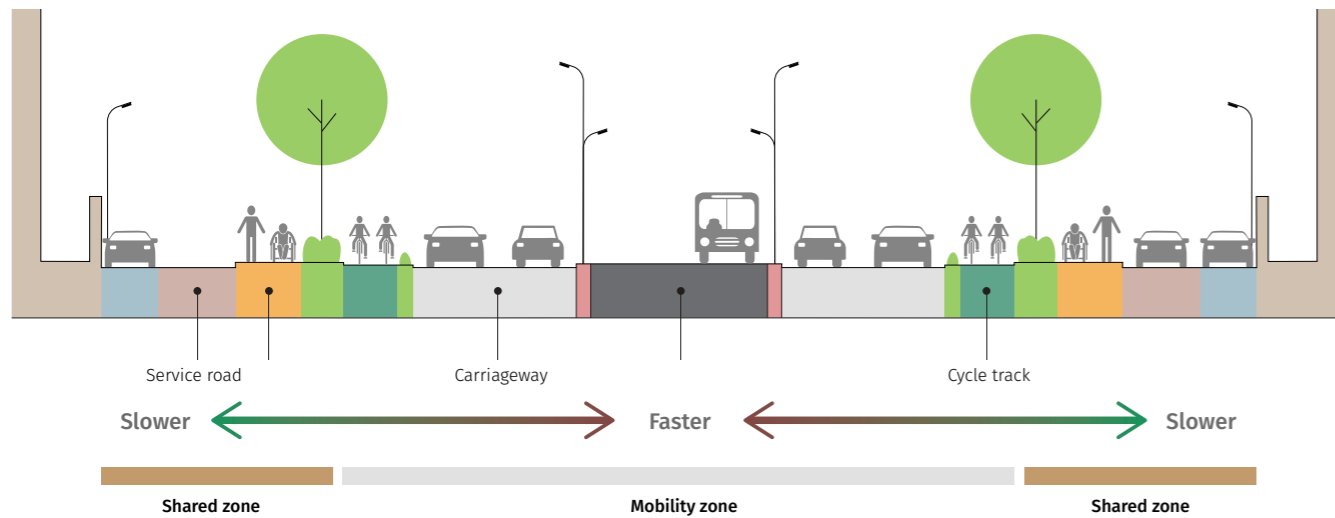
1. Introducing pedestrian and cycle links through large land parcels like playgrounds, universities, etc.
2. Carving streets through property setbacks - as and when property is redeveloped



2.3 What is a Complete Road & Street?

A complete road & street prioritises safe and comfortable mobility for all citizens through walking, cycling, and public transport, promoting clean and sustainable transportation modes.

Such roads & streets are characterised by features that encourage physical activity, social interaction and environmental sustainability. Elements such as wide footpaths, cycle lanes, greenery, on-street parking management, and public spaces contribute to a sense of community.



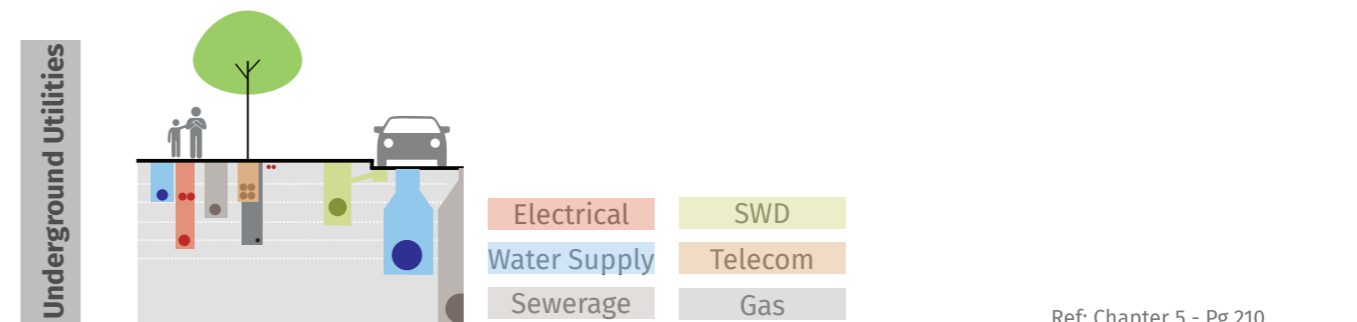
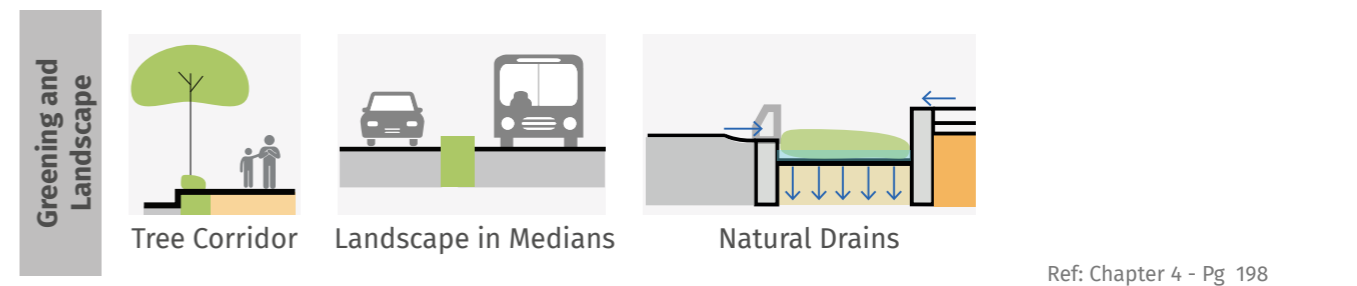
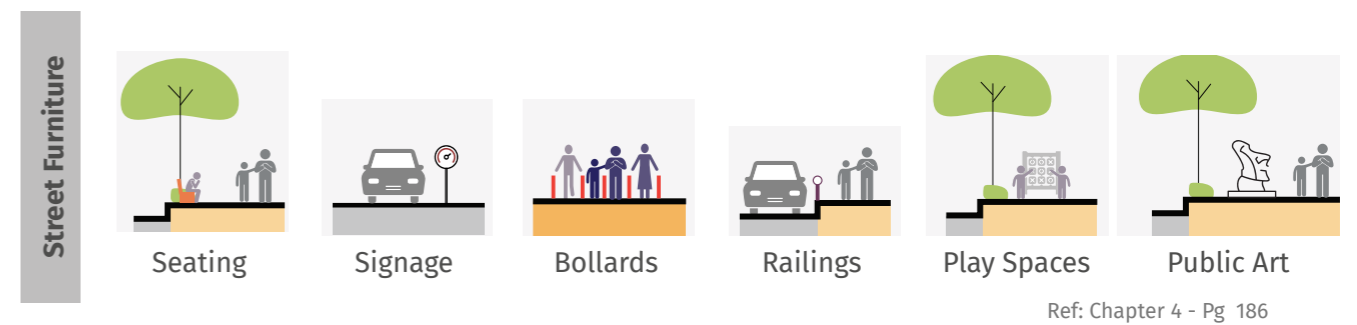
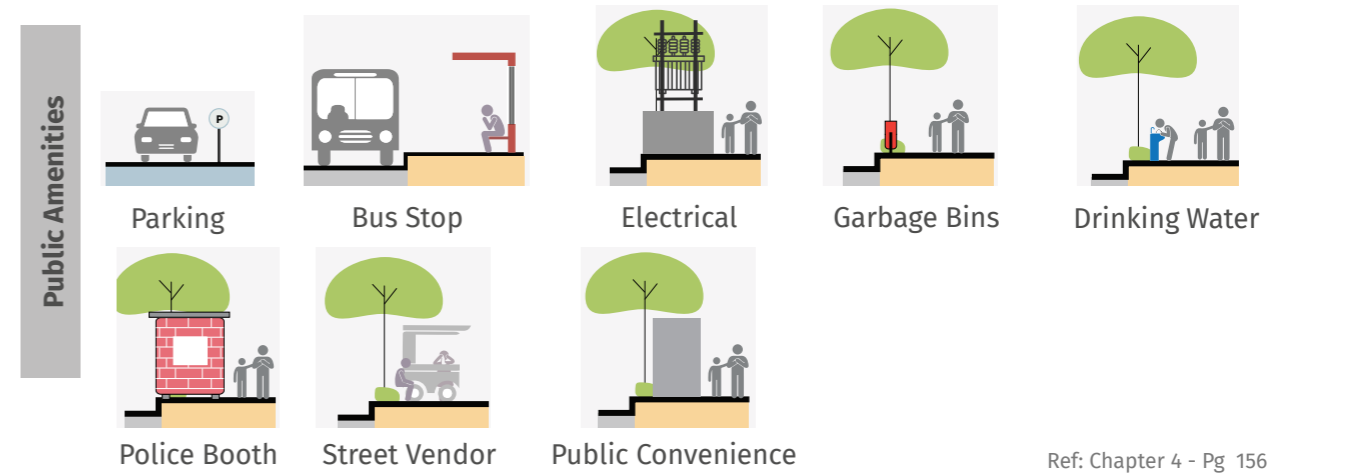
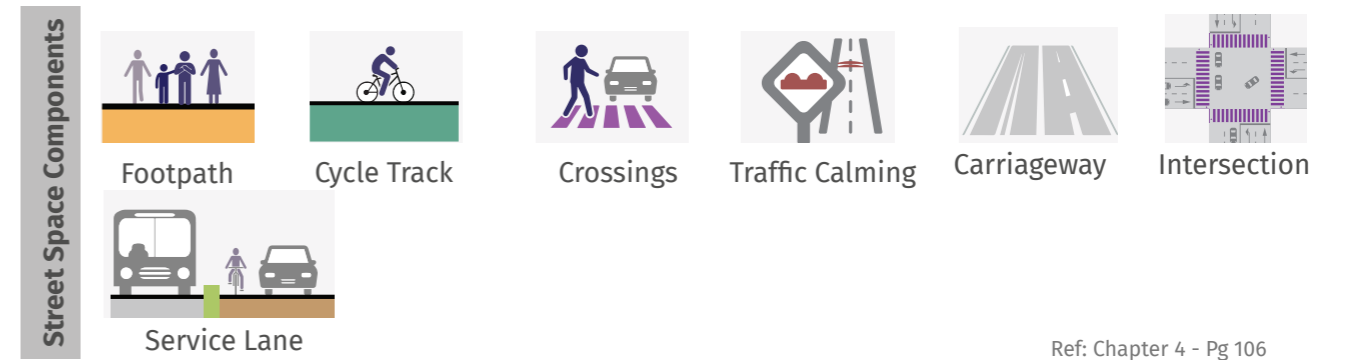
2.3.1 Street Typology

Based on their functions, carrying capacities, permissible speeds, street widths, and physical characteristics, roads & streets are then classified into Arterial, Sub-Arterial, Collector, and Local streets.

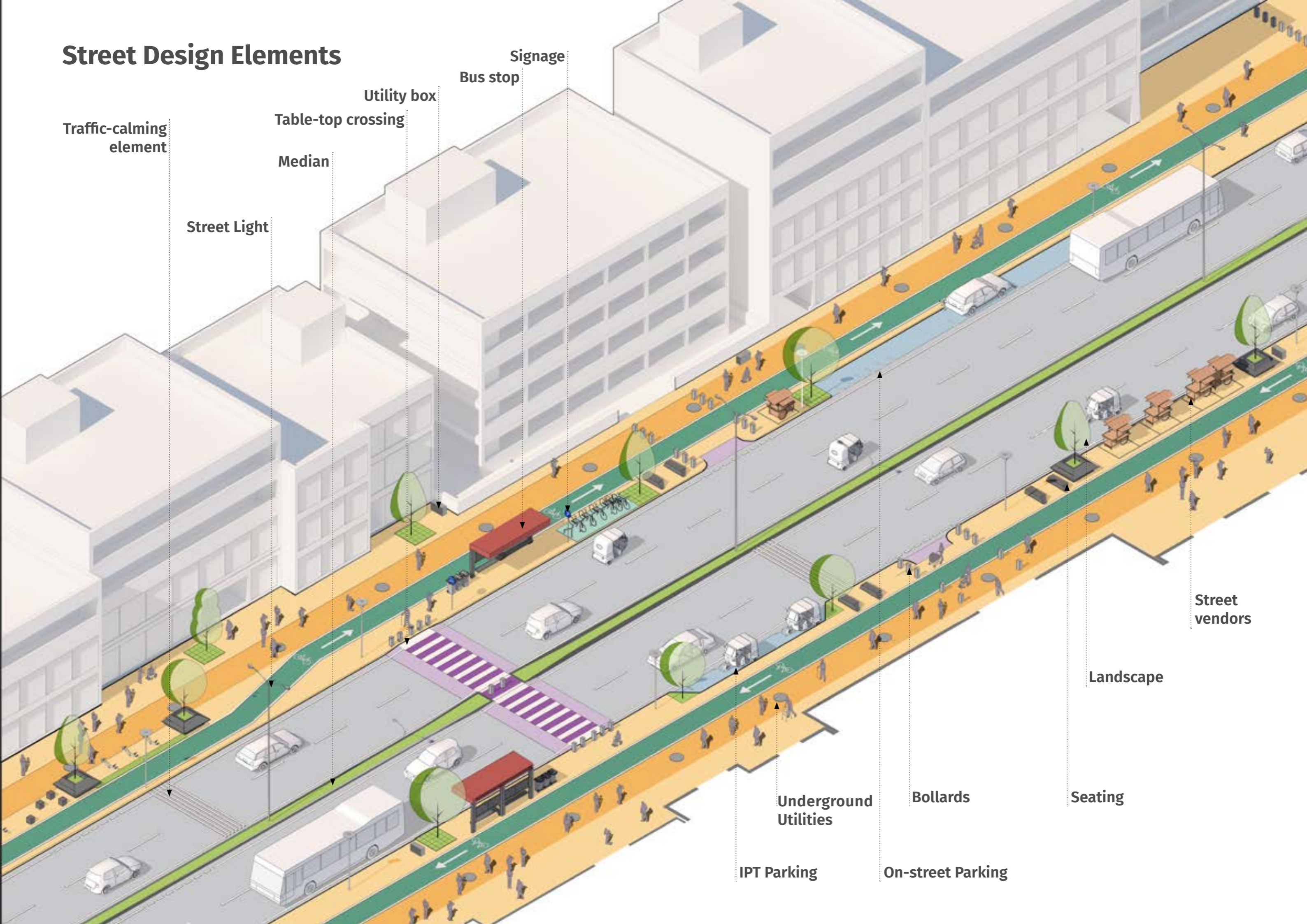
Type of Streets	Function	Max. no of lanes	RoW as per IRC	Recommended RoW	Design Speed
Arterial	Facilitates the movement of through traffic across the city, connecting major urban areas	6 lanes	45-60m	45m, 60m	60 kmph
Sub-Arterial	Functioning as secondary arteries, these streets distribute traffic between arterial and collector roads	4 lanes	30-45m	30m, 36m	60 kmph
Collector	These streets link arterial roads to local streets, ensuring connectivity between neighbourhoods within a locality	2 lanes	15-30m	18m, 24m	40kmph
Local Streets	Primarily providing direct access to buildings and residences, these streets do not facilitate through traffic	2 lanes	<15m	9m, 12m	30kmph

*The above-mentioned categories are based on their function and may correspond to the recommended RoWs. This document and Master Plan seek to achieve standardisation of RoW and a clear functional hierarchy.

2.3.2 Elements of A Complete Road & Street



Street Design Elements



Traffic-calming element

Table-top crossing

Median

Street Light

Utility box

Bus stop

Signage

Street vendors

Landscape

Seating

Bollards

Underground Utilities

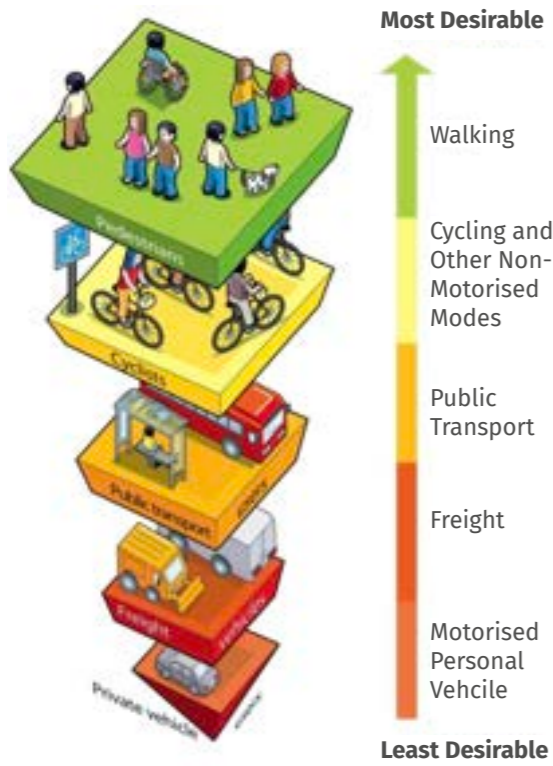
On-street Parking

IPT Parking

2.3.3 Principles of Designing a Complete Road & Street

Well-designed streets are crucial in shaping safe, efficient, and vibrant urban environments. The following principles provide a framework for optimising road space, enhancing mobility, and fostering inclusive, people-friendly streets. By integrating these principles into planning and design, cities can create equitable, efficient, and resilient urban spaces that support both daily movement and community interaction.

A. Prioritise space for walking, cycling and public transport



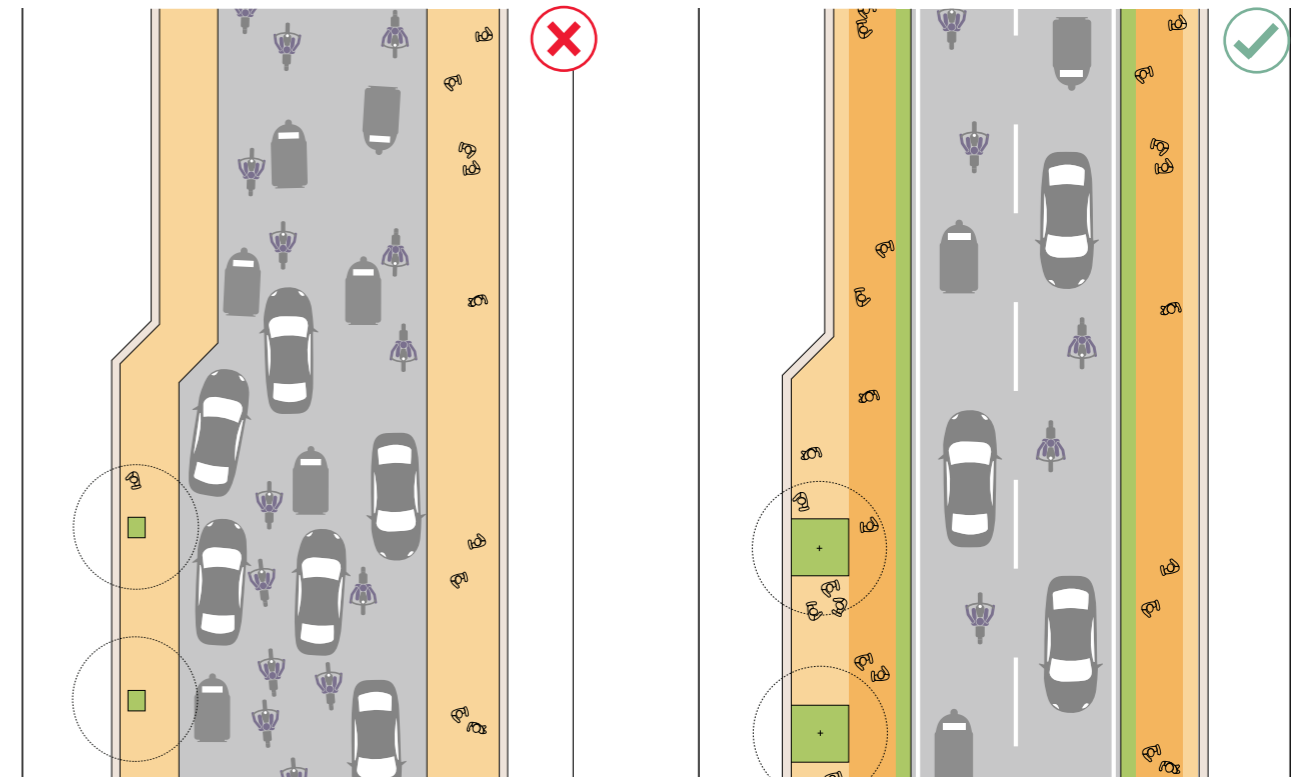
By prioritising limited street space for walking, cycling and public transport, cities can ensure that all citizens can move around their communities efficiently, affordably, and on time.

Streets should be designed to maximise efficiency by accommodating all road users, including pedestrians, cyclists, public transport, and motor vehicles. A well-balanced road space ensures smooth movement, minimises conflicts, and enhances overall mobility.



B. Maintain uniform carriageway width for one street

Varying carriageway width encourages overtaking in wider sections causing bottlenecks, congestion in narrow parts and road accidents. Consistent carriageway width ensures smooth and safe traffic flow.



C. Ensure Continuous and one-Level Footpaths

A footpath with recurrent breaks at property entrances, side streets, etc., becomes difficult to walk on and inaccessible for the differently-abled. Pedestrians do not prefer to climb onto a footpath whose height exceeds 0.15 m. Frequent obstructions discourage people from walking on the footpath.



D. Unobstructed clear walkways

A minimum clear width of 2 m must be maintained, free from encroachments, vending activities, street amenities, and utility obstructions, to enable seamless pedestrian flow and universal accessibility.



E. Liven up the Streets

The presence of street furniture invites people onto the streets and makes them lively by providing opportunities for social interaction.



F. Design for shaded streets

Well-shaded streets are aesthetically pleasing, physically comfortable, and help in tackling urban air pollution and the heat island effect. This also improves the liveability of the streets.



G. Ensure Seamless Multimodal Integration

Streets should be designed to support seamless transitions between different modes of transport, including walking, cycling, buses, metro, and shared mobility. Dedicated pick-up/drop-off zones, accessible transit stops, and safe pedestrian crossings enhance connectivity between modes.



H. Compact intersection design and crossings.

Implementing compact intersection design and appropriately positioned cross-walks not only enhances pedestrian safety and the smooth flow of vehicular traffic but also reduces congestion and lowers accident rates, resulting in a more efficient and secure transportation system.



DB Road, Coimbatore

I. Discourage Long-Term On-Street Parking

On-street parking should be designated only after prioritizing space for sustainable modes, encouraging short-term, high-turnover parking rather than long-term vehicle storage. Parking management must be planned at a network level, not in isolation, to prevent spillover effects. Implementing time restrictions, comprehensive on-street and off-street management and dynamic demand-based pricing can further optimise kerbside space usage.



NSC Bose Road, Chennai

J. Pedestrianisation of Streets

Pedestrianisation of streets is ideal in areas with high footfall and intense commercial activity. Prioritising pedestrians in such zones enhances safety, supports local businesses, and creates vibrant public spaces that encourage social interaction and active street life.

Permanent Pedestrianisation:

Streets with consistently high pedestrian footfall, dense commercial or recreational activity, limited need for vehicular access, and strong public transport connectivity are suitable for permanent pedestrianisation. These streets function as major public spaces and benefit from long-term infrastructure improvements that prioritise people over vehicles.

Temporary Pedestrianisation:

Streets with moderate activity or mixed land use can be pedestrianised temporarily during specific times—such as weekends, festivals, or peak shopping hours. This approach helps test the feasibility of full-time pedestrianisation, supports local businesses, and balances access needs for delivery vehicles and residents.



KNK Road, Chennai

K. Create Work Zone Management and Traffic Management Plans

Creating traffic management plans ensures safe and efficient movement for all street users during and after street improvements. These plans help manage vehicle flow, designate loading and unloading zones, regulate access for emergency and service vehicles, and minimise conflicts in pedestrian-priority areas. Proper planning also supports smooth transitions during construction and facilitates enforcement once the street design is implemented.

Work Zone Management includes:

- Planning safe and efficient movement of pedestrians, cyclists, and vehicles during construction.
- Providing clear signage, lighting, and barriers to guide users and prevent conflicts.
- Ensuring temporary walkways and crossings are accessible and continuous.
- Coordinating construction schedules to minimise disruption to nearby residents and businesses.
- Maintaining access for emergency, delivery, and service vehicles.
- Regularly monitoring and updating traffic diversions based on on-ground conditions.



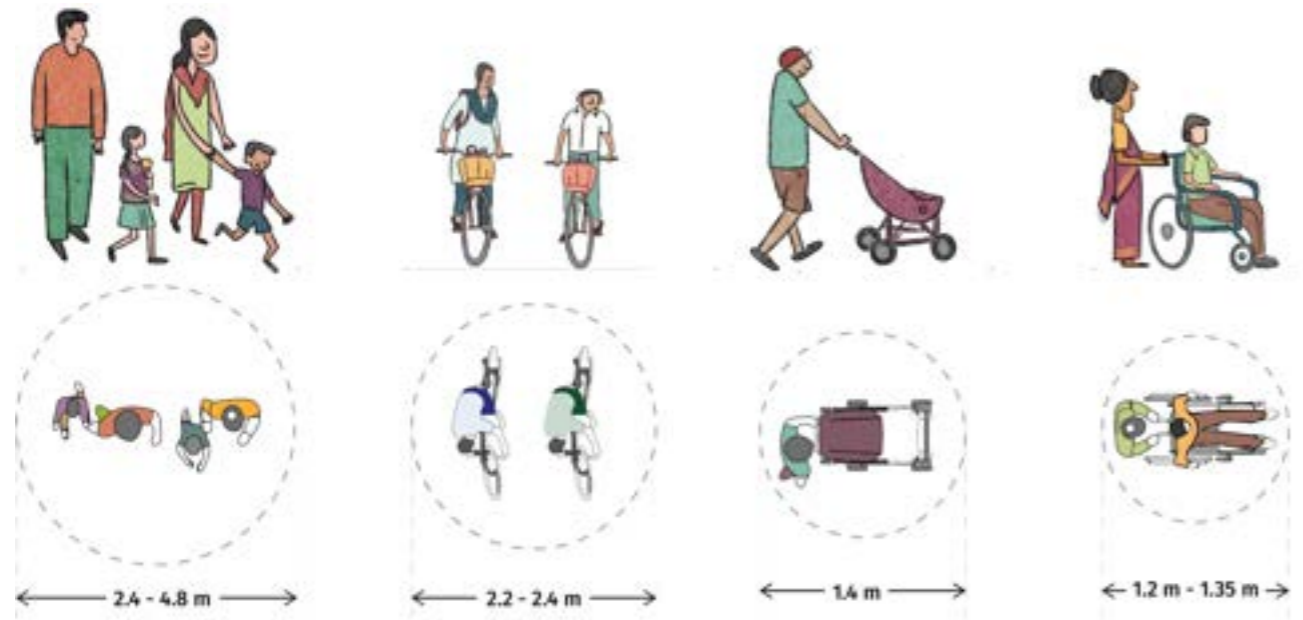
Koyembedu, Chennai

2.4 Children and Streets

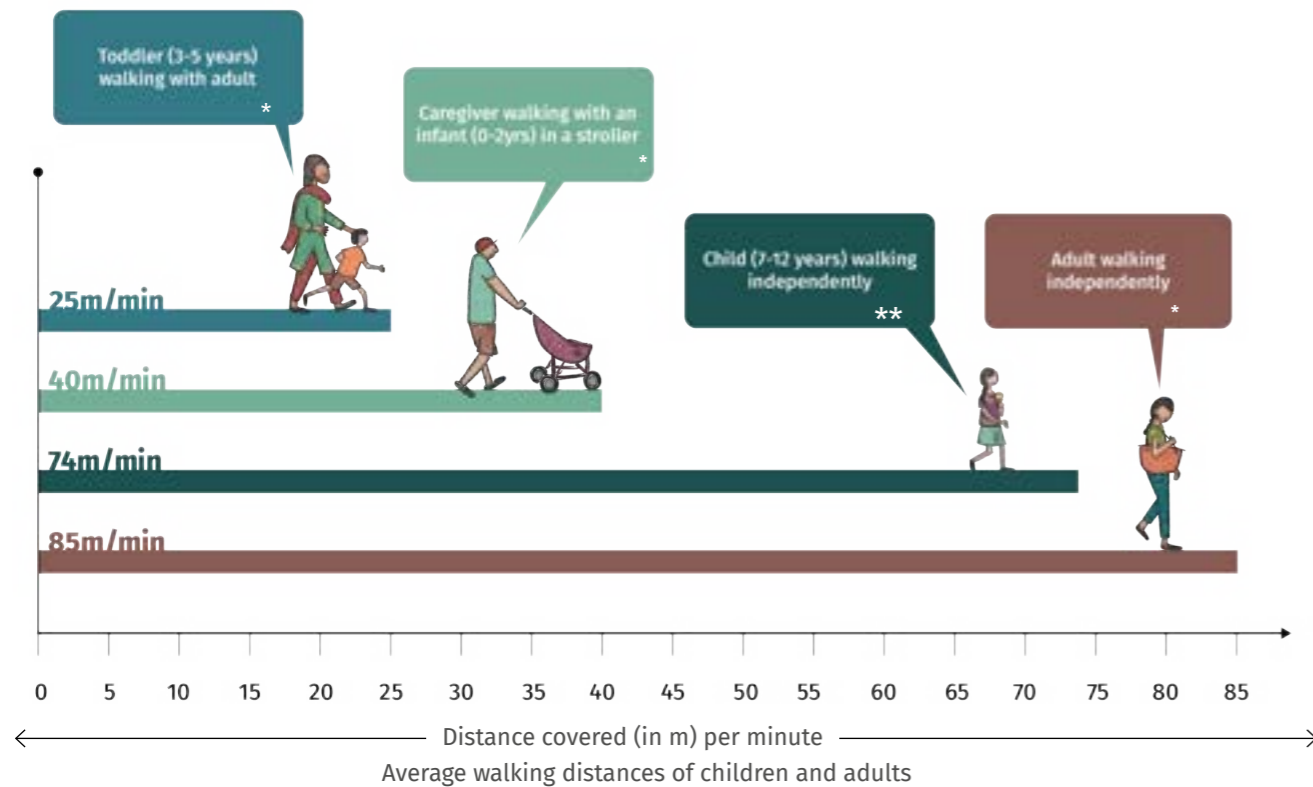
Schools are vital institutions where children spend a significant portion of their formative years, learning, socialising, and growing. School-going children, aged between 6 and 17 years (1st to 12th standard), interact differently with the Footpath, cycle tracks, parking spaces, building utilities, trash cans, landscaping, etc., than adults. Their walking speeds, depending on age, are also slower than adults' speeds, and children are closer to the ground than adults due to their height.

2.4.1 Designing streets around schools

It is therefore important to study children's physical behaviour, developmental stages and ergonomics to help design safe streets that accommodate their physical growth and limitations, and that foster healthy interactions.



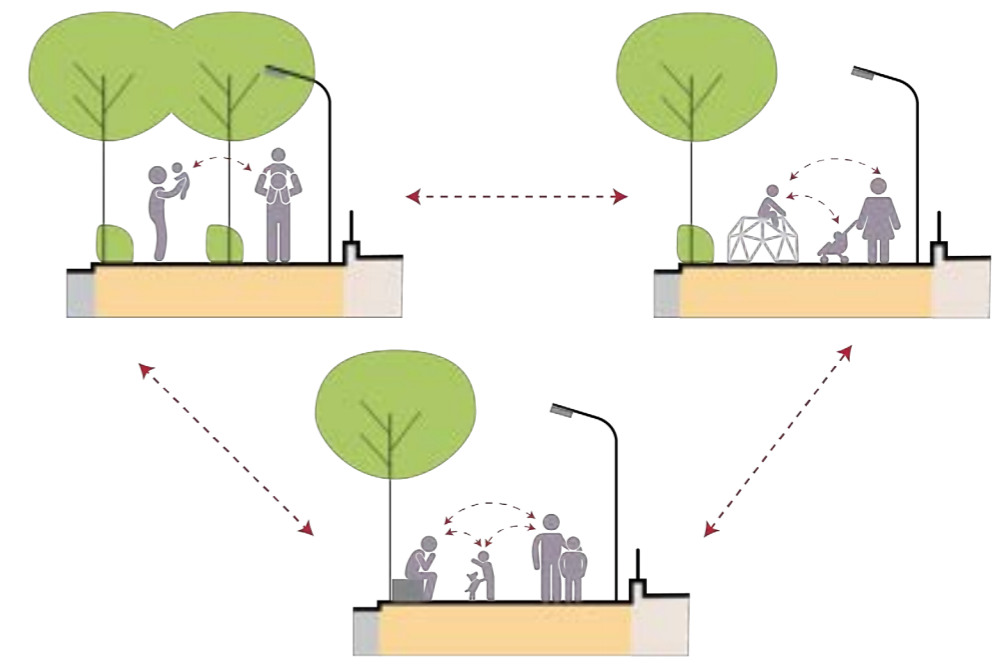
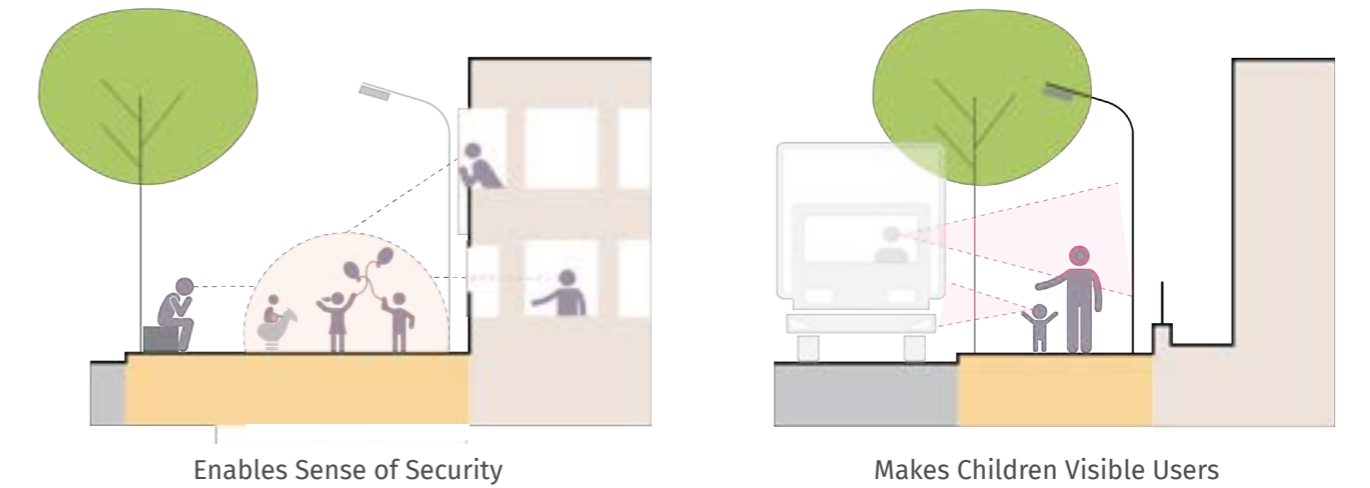
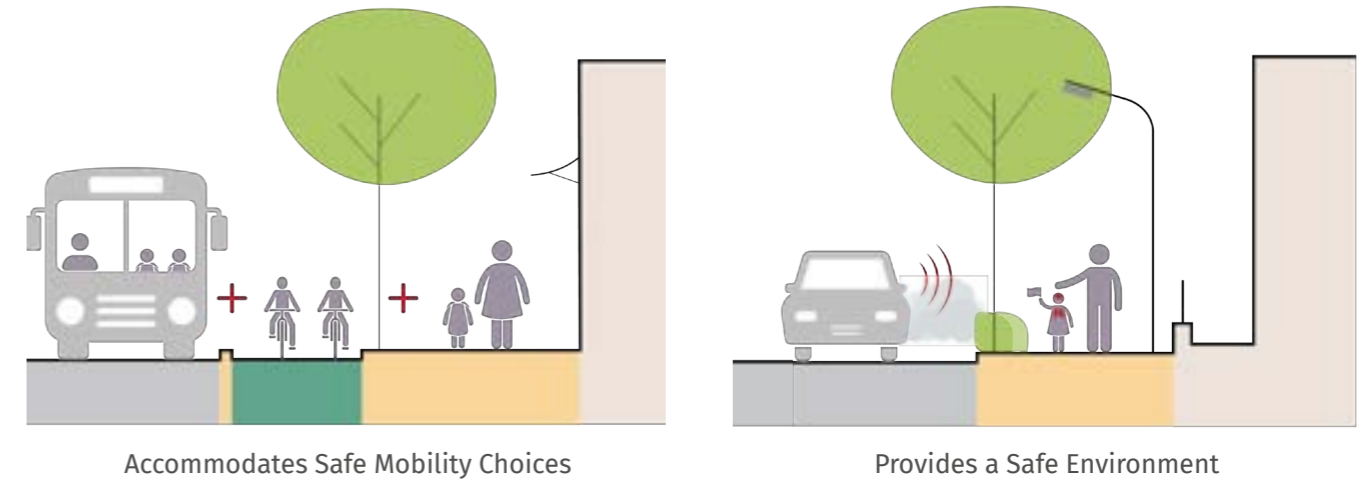
Space requirements for children and caregivers as per Designing Streets For Kids, Global Designing Streets Initiative



* Infant, toddler and caregiver-friendly neighborhoods Design Guidelines, 2019, BvLF
 ** Study on Normal Walking Speed According to Age and Gender in Preliminary Students in Surabaya, 2022

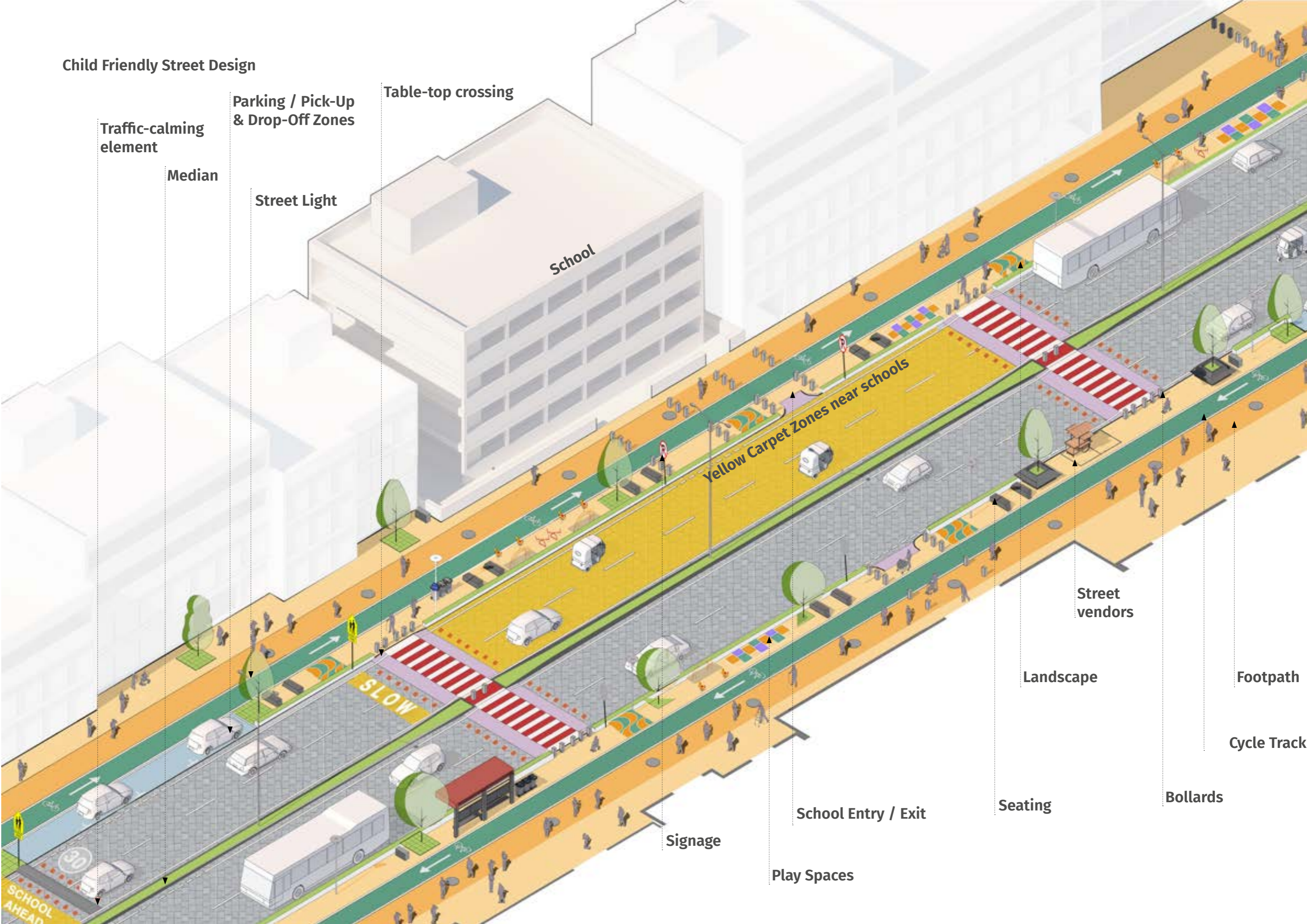
2.4.2 Principles Streets designed for children*

* Graphics inspired by "Designing Streets for Kids" by Global Designing Cities Initiative



Supports Spaces for Interaction, Pause, Play and Learning

Child Friendly Street Design



Traffic-calming element

Median

Parking / Pick-Up & Drop-Off Zones

Street Light

Table-top crossing

School

Yellow Carpet Zones near schools

Street vendors

Landscape

Footpath

Cycle Track

Seating

Bollards

School Entry / Exit

Signage

Play Spaces

SCHOOL AHEAD

30

MOTOR SLOW

2.4.3 Type of School Streets



All streets within the School Zone (defined as a 500m radius around the school) shall be designed with safe infrastructure to facilitate the movement of school children.

However, streets adjacent to school entries and exits typically experience higher student volumes than other streets in the zone. Therefore, streets within the School Zone can be categorised into two types—School Streets and Access Streets—each requiring distinct design treatments.

School Streets

School Streets are streets that directly host the school's entry or exit points. These streets carry a higher volume of students and are the primary locations for pick-up and drop-off activities. A School Street is defined as the street segment with the school entry/exit that extends up to the boundary of the School Zone on either side.

This chapter focuses on the design treatment of School Streets, unless specified otherwise.

The extent of the School Street can be modified based on the context and overlapping school zones as shown in the two images below.



■ School
● School Zone
— School Street
— School Access Street

School Access Streets


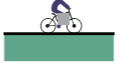










School access: Streets are streets used by students and parents to reach the School. These typically carry fewer students than School Streets.

School Access Streets shall follow the general design recommendations outlined in Chapter 4, with the addition of traffic calming and way-finding elements to support safer access.



■ School
● School Zone
— School Street
— School Access Street

2.4.4 Elements of School Streets and Access Streets

Element	School Street	School Access Street
 Segregated footpath Refer to Chapter 2 and 5 for details	✔	✔
 Segregated cycle track Should be on streets with RoW ≥18m	✔	✔
 Traffic Calming	✔	✔
 Way-finding	✔	✔
 School Entry/ Exit	✔	✘
 Parking Refer to Chapter 5.2.6 for details	—	✔
 Pick-up & Drop off Zones Refer to Chapter 5.2.7 for details	—	✔
 Pedestrian & Cyclist Crossing	✔	✔
 Play and Learning Spaces	✔	—
 Transit Stations	—	—
 Tree Corridor	✔	✔
 Street Furniture	✔	—

✔ Should be present — May be present ✘ Should not be present

The provision of the above-mentioned elements shall be determined based on the context and the children's needs, and shall also factor in the type of street to be designed.



South Avenue Road, Chennai

3

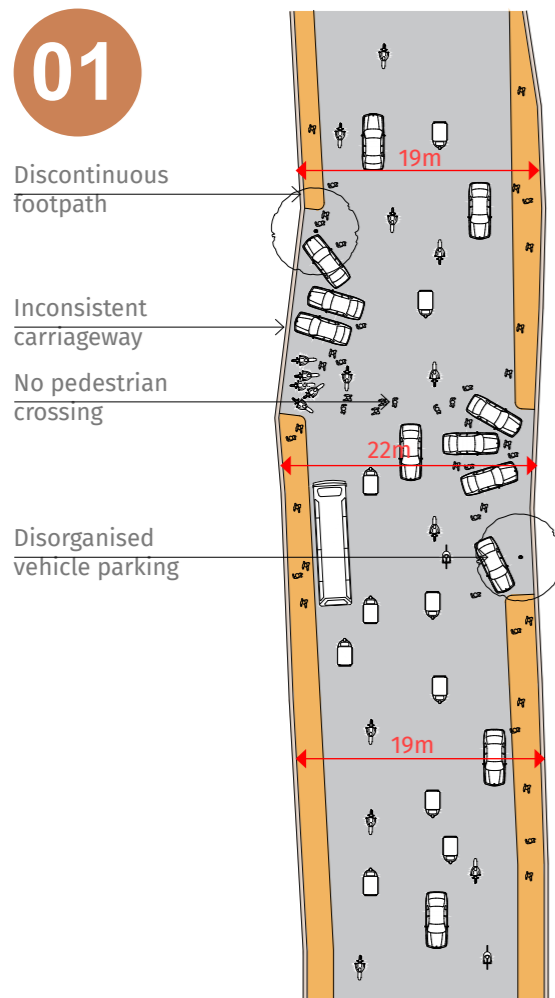
Road & Street Design Templates

- 3.1. Standard Street Templates
- 3.2. Compact and Safe Intersections/ Junctions
- 3.3. Road Markings and Signage

3.1 Standard Street Templates

Street design begins with a comprehensive site analysis to understand the context, including street width, land use, the current state of the Footpath, crossings, other elements, traffic volume, and the behaviour of various road users, such as pedestrians and cyclists.

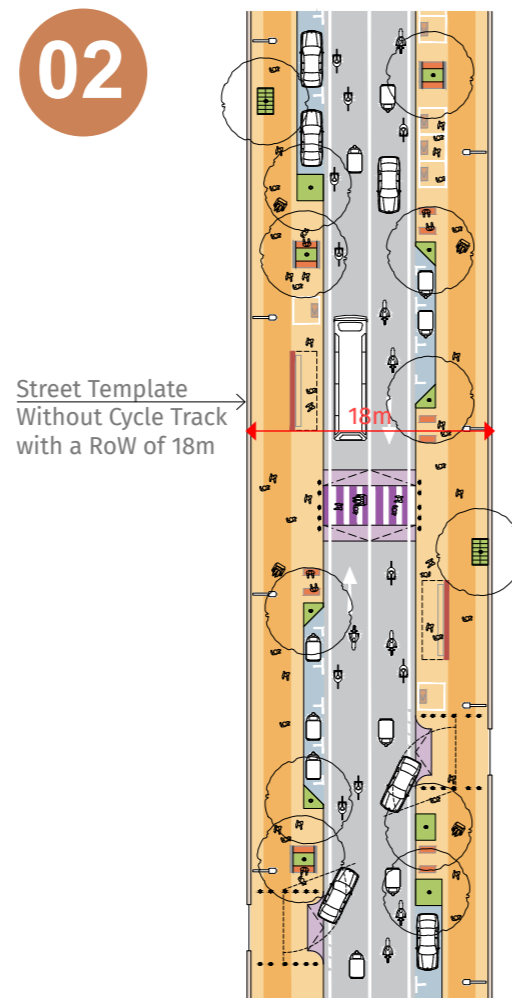
Further, based on the city's vision of creating a Complete Street, an appropriate street template can be contextualised.



Study existing conditions

Study the existing conditions on the street, including the available Right-of-Way (RoW), vehicle movement, adjoining land-use, buildings that attract high footfall, vending activities, pedestrians crossing facilities, existing condition of the Footpath, parking counts, violations, etc.

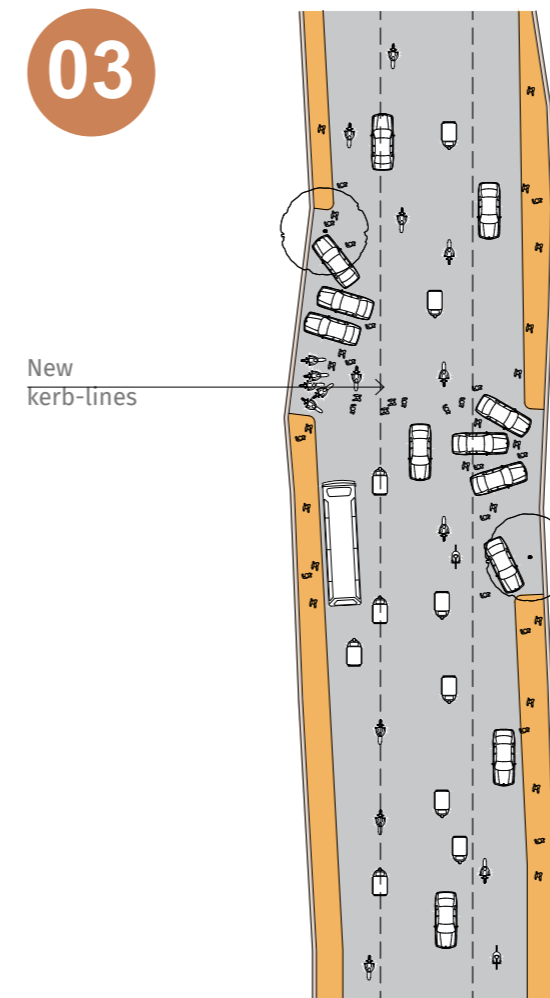
Identify and demarcate all RoWs on the street between two consecutive intersections.



Identify street template

Based on the following key points, select a relevant street template:

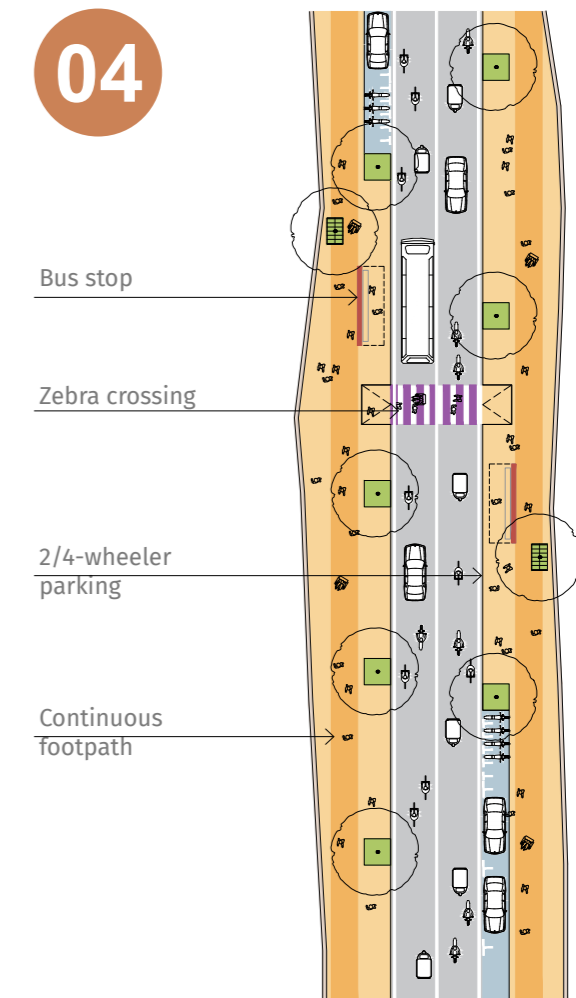
- Primary right-of-way (RoW) of the existing street.
- Adjacent land-use and street activities.
- Street typology



Overlay the template

Overlay the selected template on the drawing of the existing street.

Align the centreline and mark new kerb-lines on the street.



Detail the street design

Refer to 'Chapter 4: Street design elements' and detail out the street edge to suit the local context.

Recommended Right of Way for Existing and Proposed Roads

All road developments projects shall adhere to the standardised Right of Way (RoW) allocations to ensure consistency, safety, and equitable use of road/street space

Typology no	Category	RoW	No of Lanes	Footpath	Cycle Track	Tree Corridor	Median	Service Lane	BPL/ BRTS	Metro/Elevated	Multi-Utility Zone	Parking
1a	Arterial Road	60m	8	✓		✓	✓	✓	✓		✓	✓
1b	Arterial Road	60m	6	✓	✓	✓	✓	✓		✓	✓	✓
1c	Arterial Road	45m	6	✓		✓	✓	✓	✓		✓	✓
1d	Arterial Road	45m	4	✓	✓	✓	✓	✓		✓	✓	✓
2a	Sub-arterial Road	36m	6	✓		✓	✓		✓		✓	✓
2b	Sub-arterial Road	36m	4	✓	✓	✓	✓			✓	✓	✓
2c	Sub-arterial Road	30m	4	✓		✓	✓			✓	✓	✓
2d	Sub-arterial Road	30m	4	✓		✓	✓				✓	✓
2e	Sub-arterial Road	30m	4	✓	✓	✓	✓				✓	✓
3a	Collector Street	24m	4	✓		✓	✓				✓	✓
3b	Collector Street	24m	2	✓	✓	✓					✓	✓
3c	Collector	18m	2	✓		✓					✓	✓
4a	Local Street	12m	2	✓		✓						
4b	Local Street	9m	2	✓							✓	



4b

9 m RoW

Local Street

2 Lanes with One-Side Footpath

It can facilitate a dedicated pedestrian path alongside vehicular traffic.

This configuration is suitable for local street with mixed-use areas with moderate pedestrian activity.

The pedestrian path provides safety and convenience for walkers, while vehicles use the remaining street space.

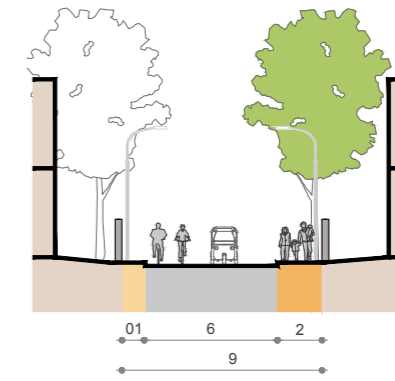
Examples of 9m wide roads in Thoothukudi include Millerpuram West Main Road, Boltenpuram 2nd street and Teachers' Colony Main Road.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Buses
Service Lane	

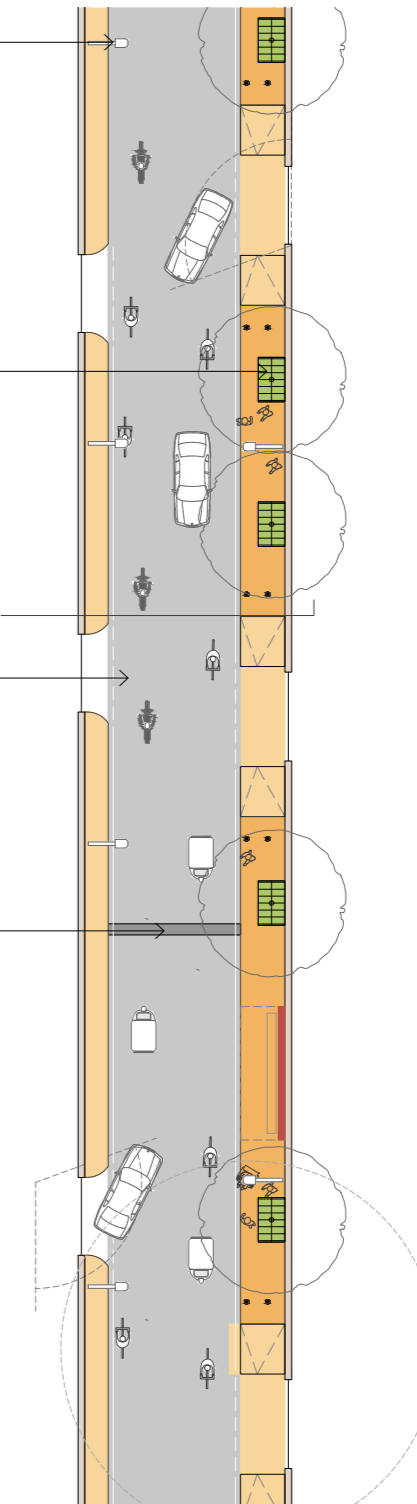


Street Light

Existing Tree Pit
grating level
+150mm

Property Access
Level ±0.00mm

Speed Hump



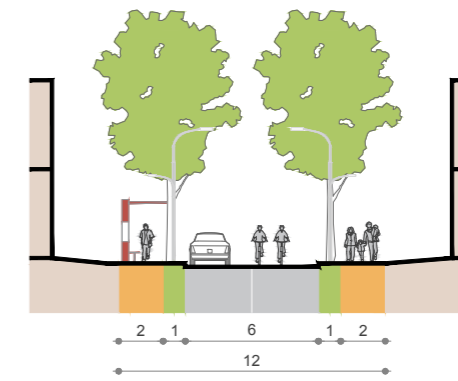
4a 12 m RoW

Local Street

2 lanes with Symmetrical Footpath

This equal distribution of footpath space without on-street parking enhances safety and convenience for pedestrians, making it ideal for mixed-use areas, and urban neighbourhoods.

Examples of 12m wide roads in Thoothukudi include Chidambara Nagar Main Road, Boltenpuram Main Road and Bala Vinayagar Koil Road.



Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Buses
Service Lane	

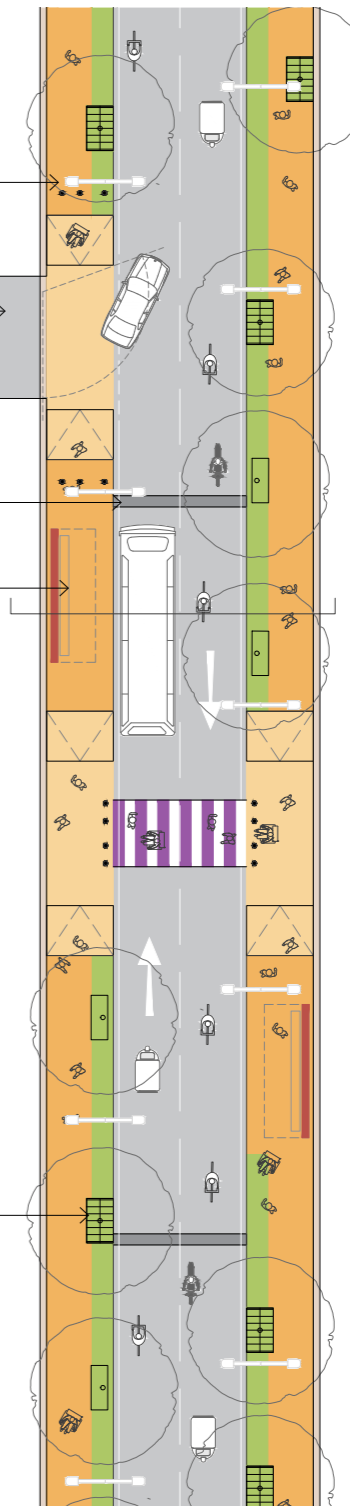
Street Light

Local Street level ±0.00mm

Speed Hump

Bus Stop

Existing Tree Pit
grating level +150mm



3c 18 m RoW

Collector Street

2 lanes with Symmetrical Footpath

It is well-suited for areas with mixed land use, high pedestrian activity, and retail or commercial establishments while maintaining vehicular accessibility.

Cyclists will be in mixed traffic, hence streets should be traffic calmed to ensure speeds are within 30km/h, suitable for collector streets.

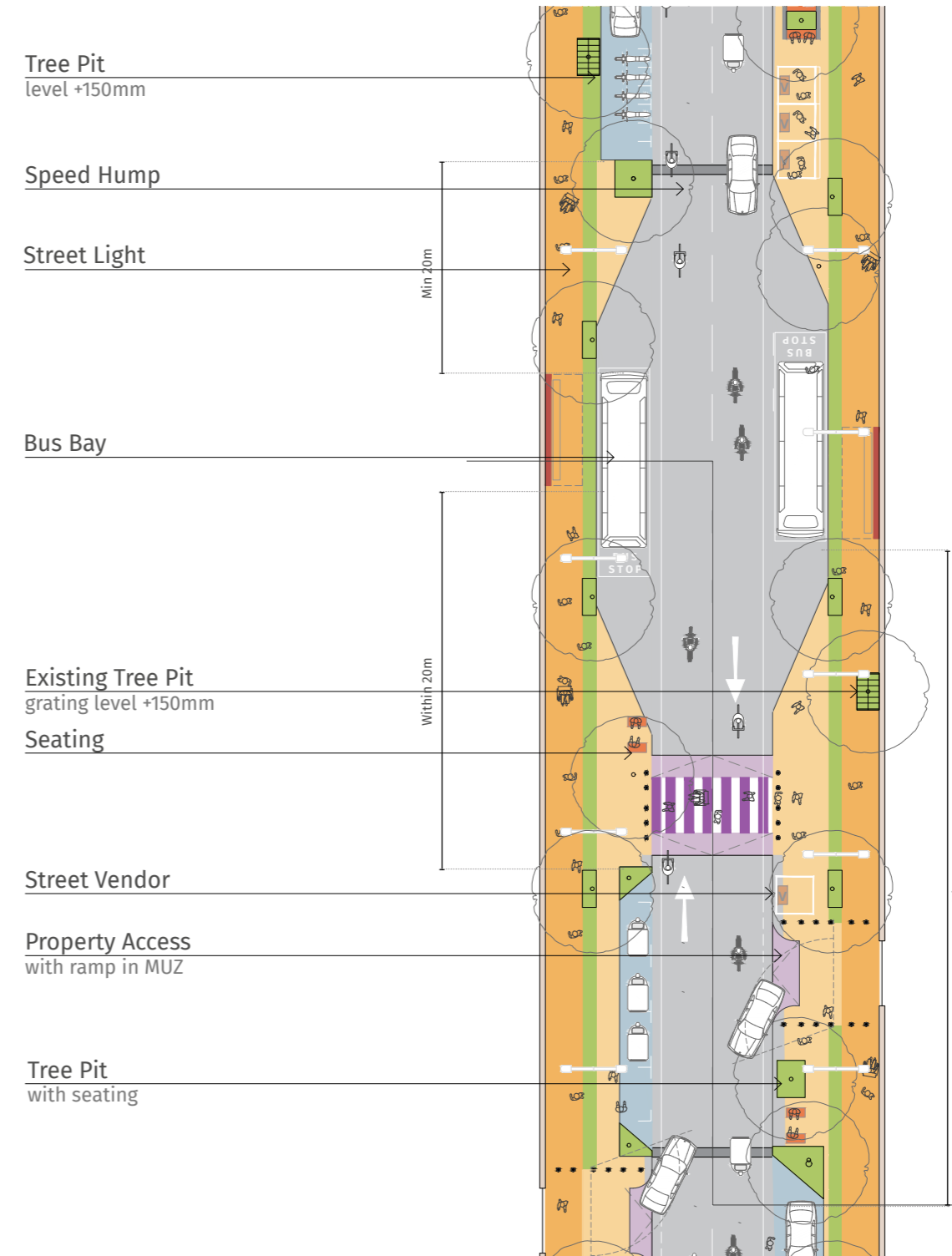
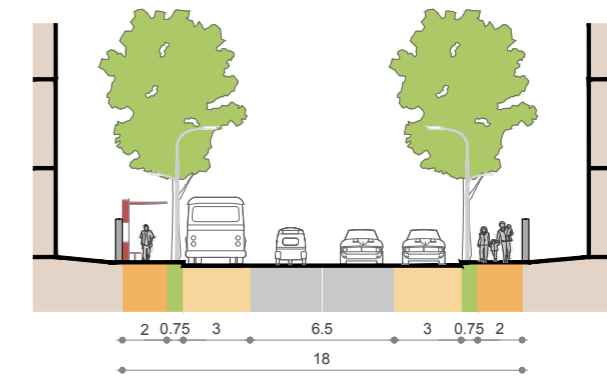
Examples of 18m wide roads in Thoothukudi include VVD main Road, 60' Road - SBI Colony and 60' Road - Polpettai.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Buses
Service Lane	



3b 24 m RoW

Collector Street

2 lanes with Segregated Cycle Tracks

This template shall be considered for collector streets where vehicle speeds are above 30kmph.

A segregated cycle track ensures safety of cyclists from fast-moving vehicles.

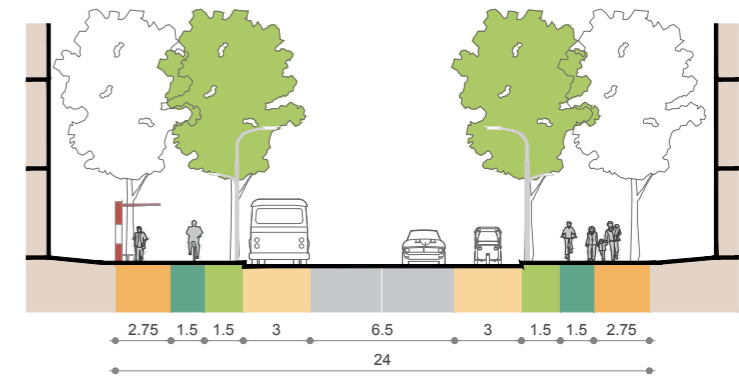
Examples of 24m wide roads in Thoothukudi include Tiruchendur Road and Ettayapuram Road.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Buses
Service Lane	



Property Access
with ramp in MUZ

Street Vendor

Speed Hump

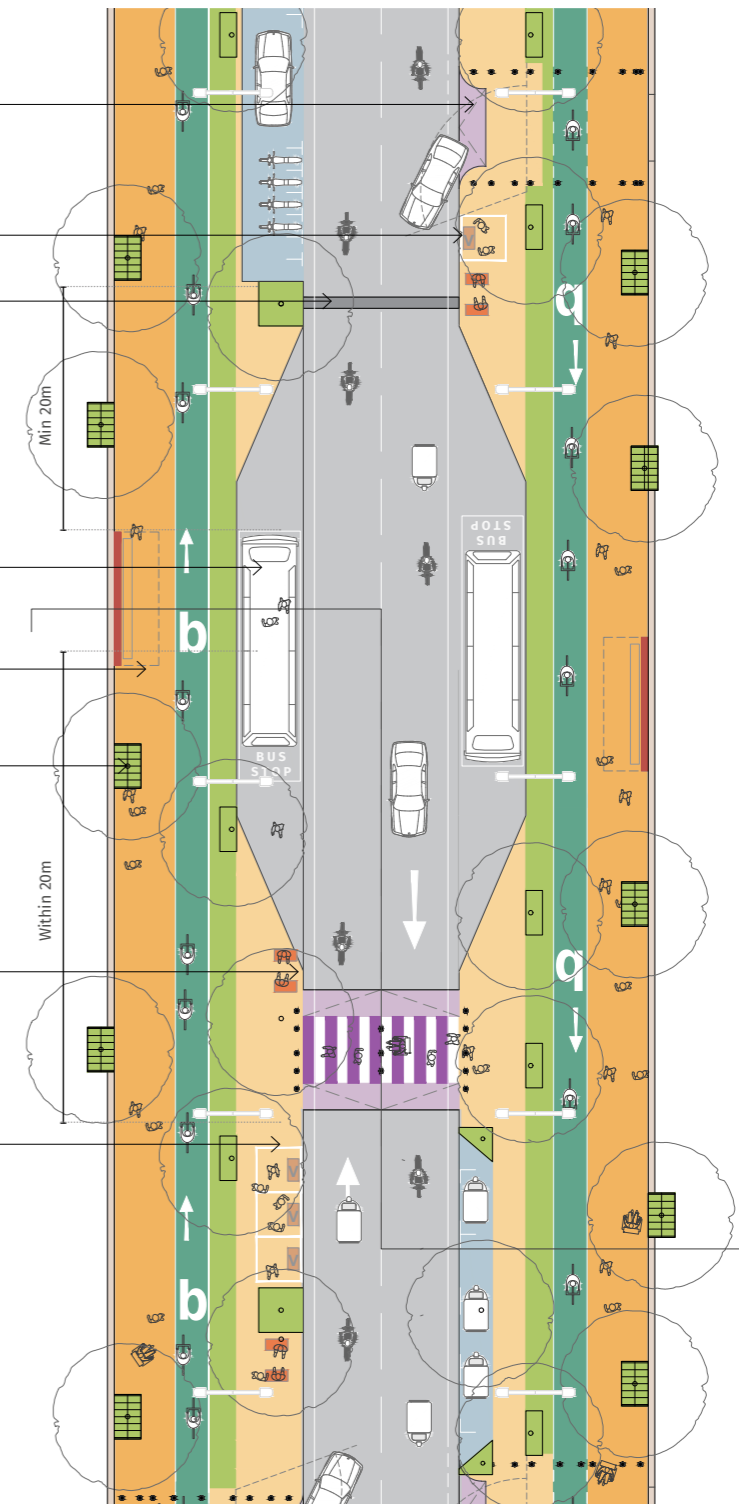
Bus Bay

Street Light

Existing Tree Pit
grating level +150mm

Seating

Tree Pit
level +150mm



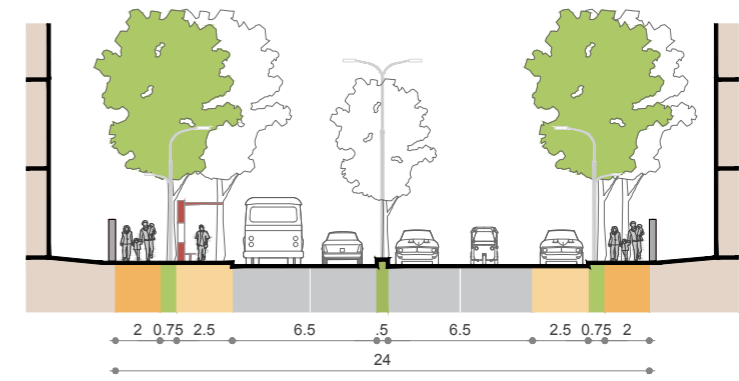
3a 24 m RoW

Collector Street

4 lanes without Cycle Tracks

This template works effectively for collector streets in mixed and commercial land-use.

Examples of 24m wide roads in Thoothukudi include Tiruchendur Road and Ettayapuram Road.



Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Buses
Service Lane	

Speed Hump

Property Access
with ramp in MUZ

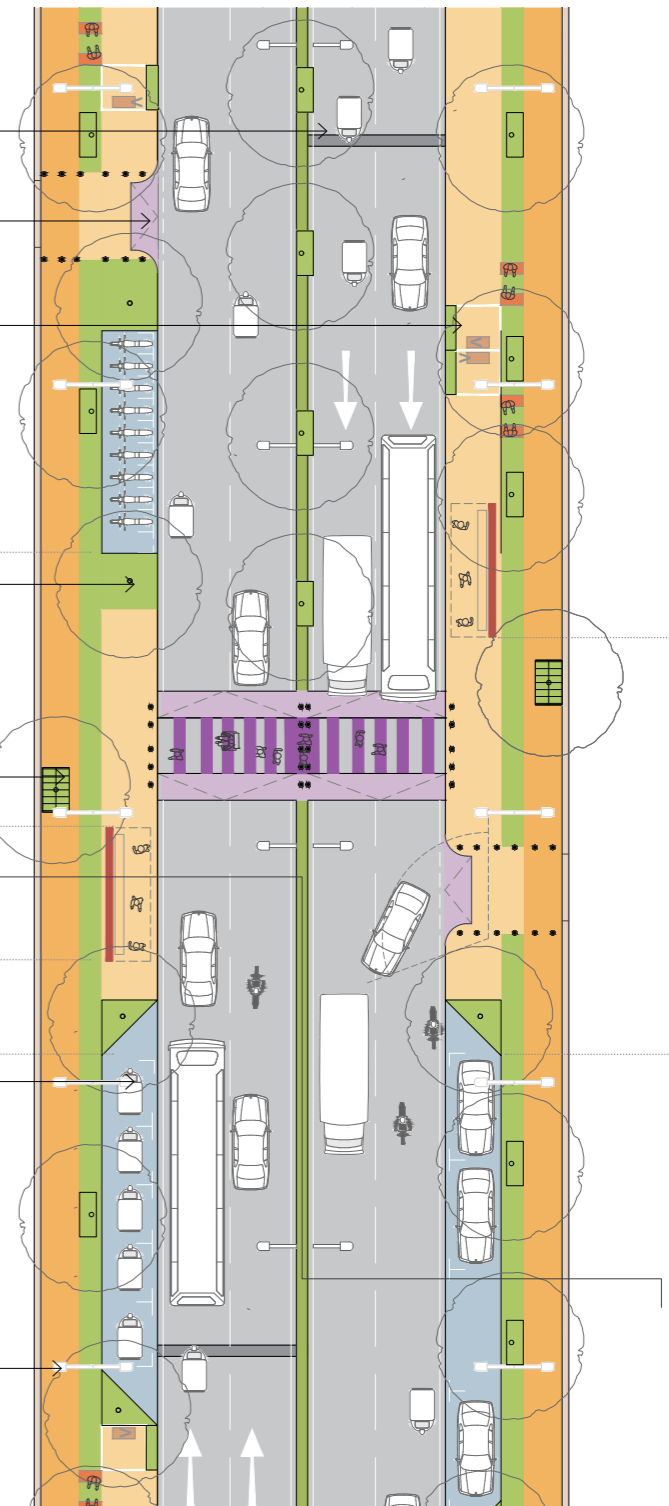
Street Vendor

Tree Pit
level +150mm

Existing Tree Pit
grating level +150mm

IPT Pick/Drop Bays

Street Light



2e 30 m RoW

Sub-Arterial Road

4 lanes with Segregated Cycle Track

The template excels in sub -arterial roads of mixed-use areas where urban vibrancy is vital, such as city centres, commercial districts, and neighbourhoods with significant pedestrian footfall.

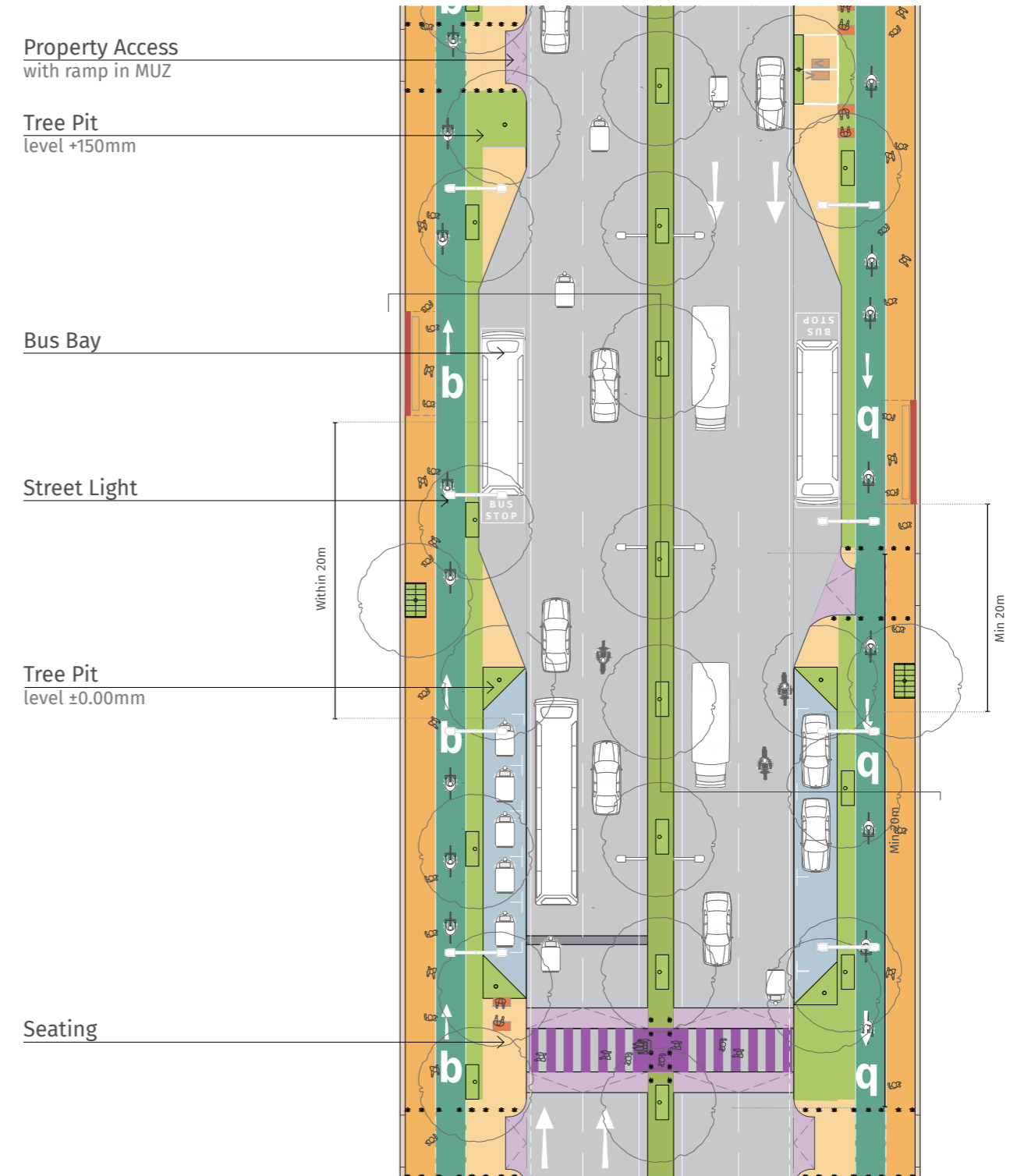
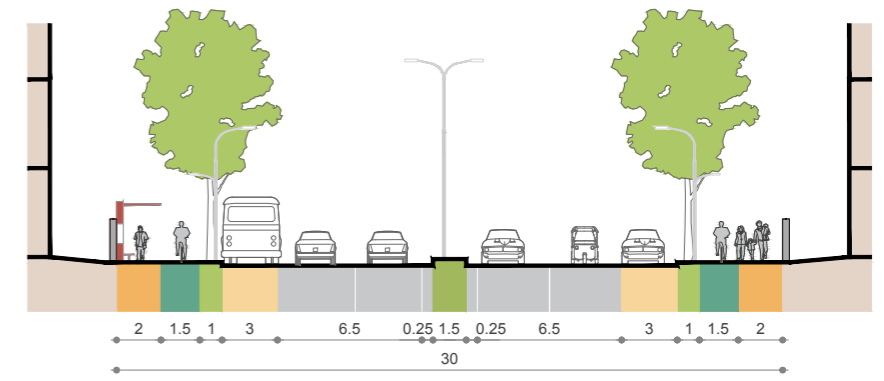
Examples of 30m wide roads in Thoothukudi include the SH 176 - Madurai - Tiruchendur corridor.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Buses
Service Lane	



2d 30 m RoW

Sub-Arterial Road

4 lanes with Metro

The template is ideal for 4-lane corridors with metro alignments, where high transit ridership and pedestrian activity demand safe, continuous, and well-integrated streets. It emphasizes seamless access to metro stations, organized feeder and pick-up zones, and multimodal integration while maintaining efficient vehicle movement.

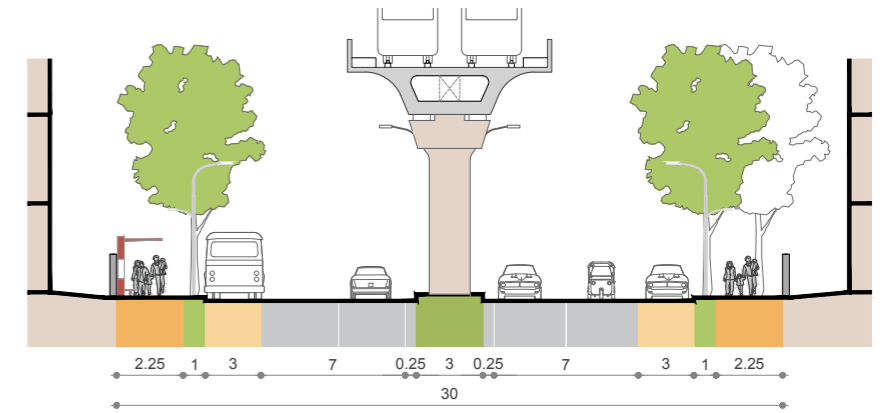
Examples of 30m wide roads in Thoothukudi include the SH 176 - Madurai - Tiruchendur corridor.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Metro Corridor
Service Lane	



Seating

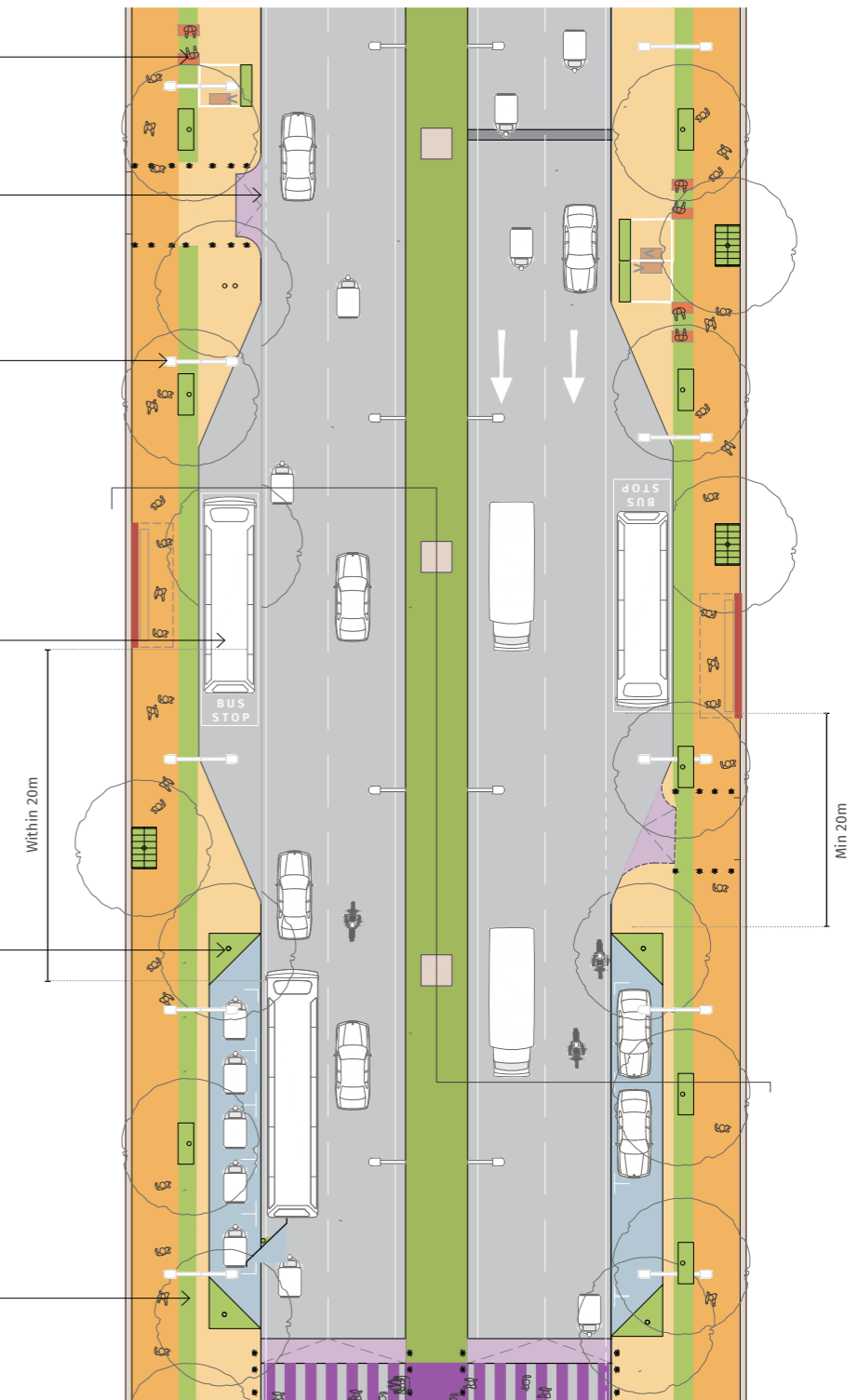
Property Access
with ramp in MUZ

Street Light

Bus Bay

Tree Pit
level +150mm

Tree Pit
level ±0.00mm



2c 30 m RoW

Sub-Arterial Road

4 lanes without Segregated Cycle Track

Sub-arterial road performing as an functional Arterial road with commercial and mixed use land use adjacent

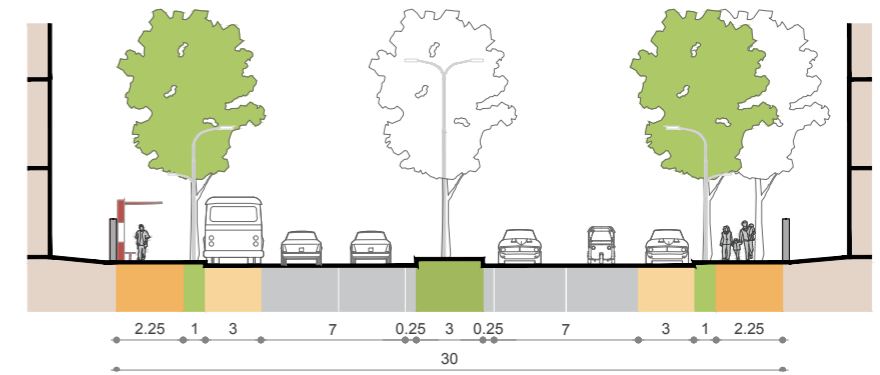
Examples of 30m wide roads in Thoothukudi include the SH 176 - Madurai - Tiruchendur corridor.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Buses
Service Lane	



Speed Hump

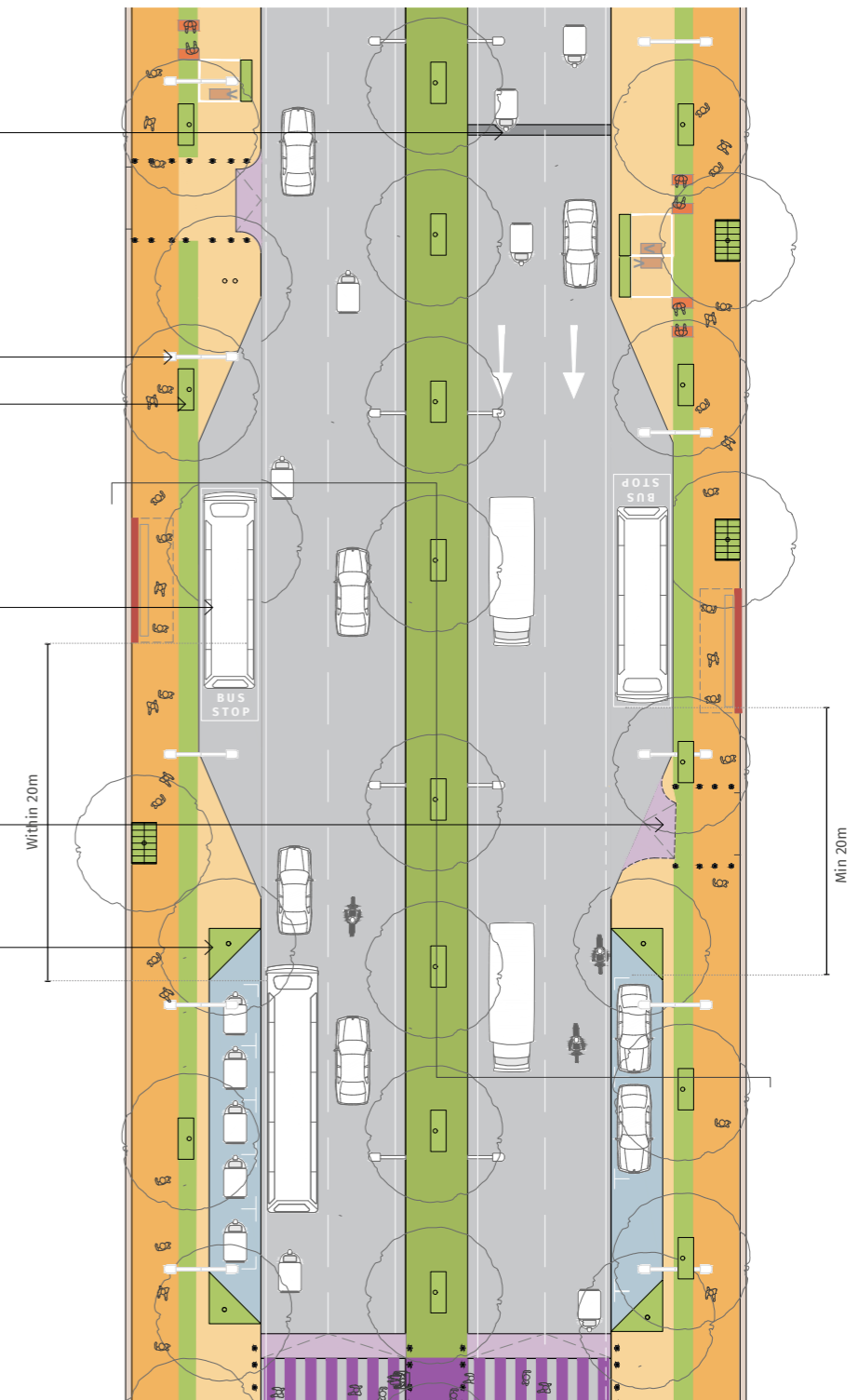
Street Light

Tree Pit
level ±0.00mm

Bus Bay

Property Access
level

Tree Pit
grating level +150mm



2b 36 m RoW

Sub-Arterial Road

4 lane with Metro and Segregated Cycle Track

It is well-suited for arterial roads, major urban corridors with high-intensity traffic. It prioritizes efficient public transportation and non-motorized travel

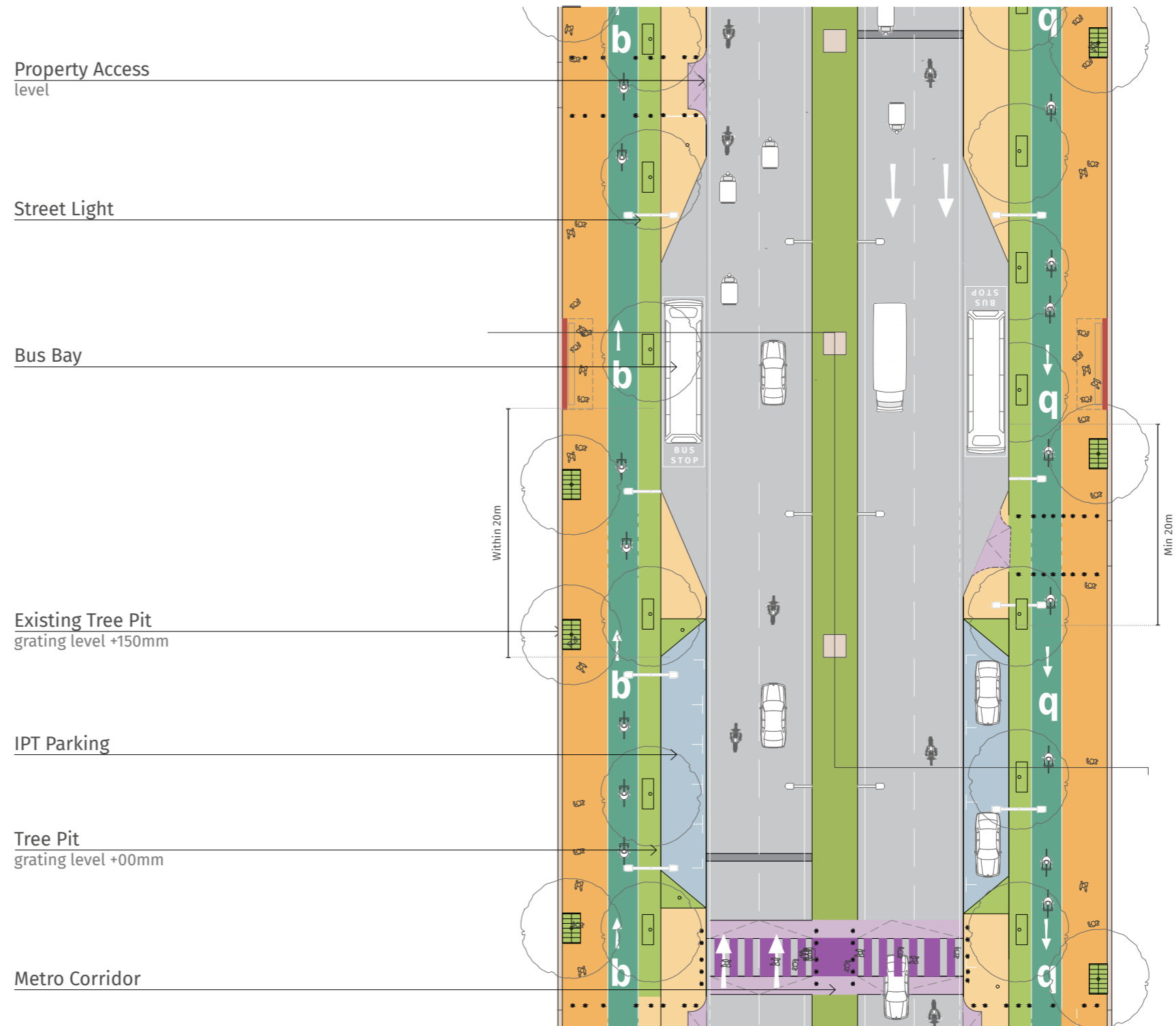
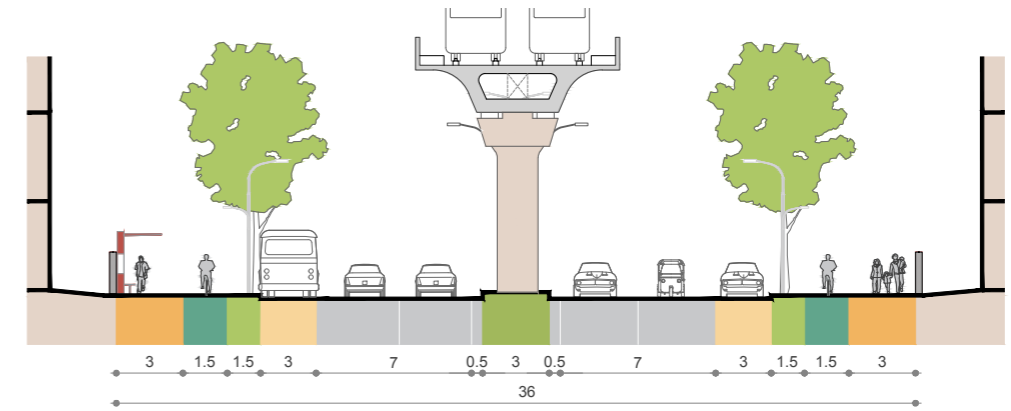
Examples of 36m wide roads in Thoothukudi include Palayamkottai Main Road.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Metro Corridor
Service Lane	



2a 36 m RoW

Sub-Arterial Road

4 lane with Dedicated Bus Lane

It is well-suited for arterial roads, major urban corridors with high-intensity traffic. It prioritizes efficient public transportation, non-motorized travel and vehicle movement

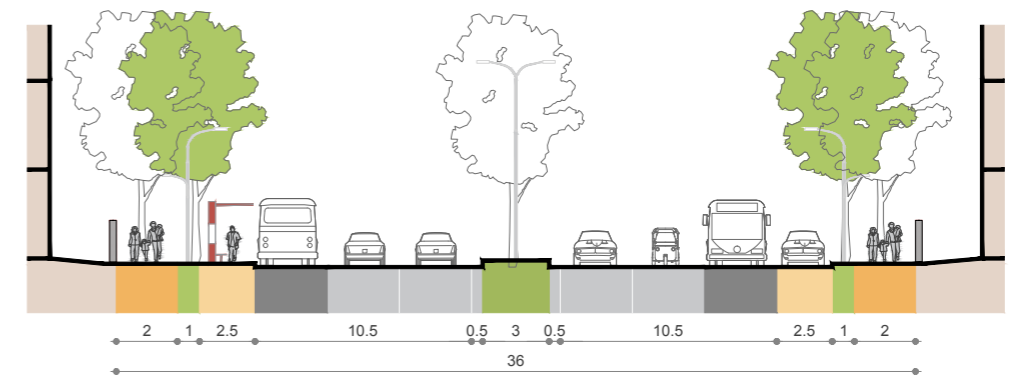
Examples of 36m wide roads in Thoothukudi include Palayamkottai Main Road.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Dedicated Bus Lane
Service Lane	



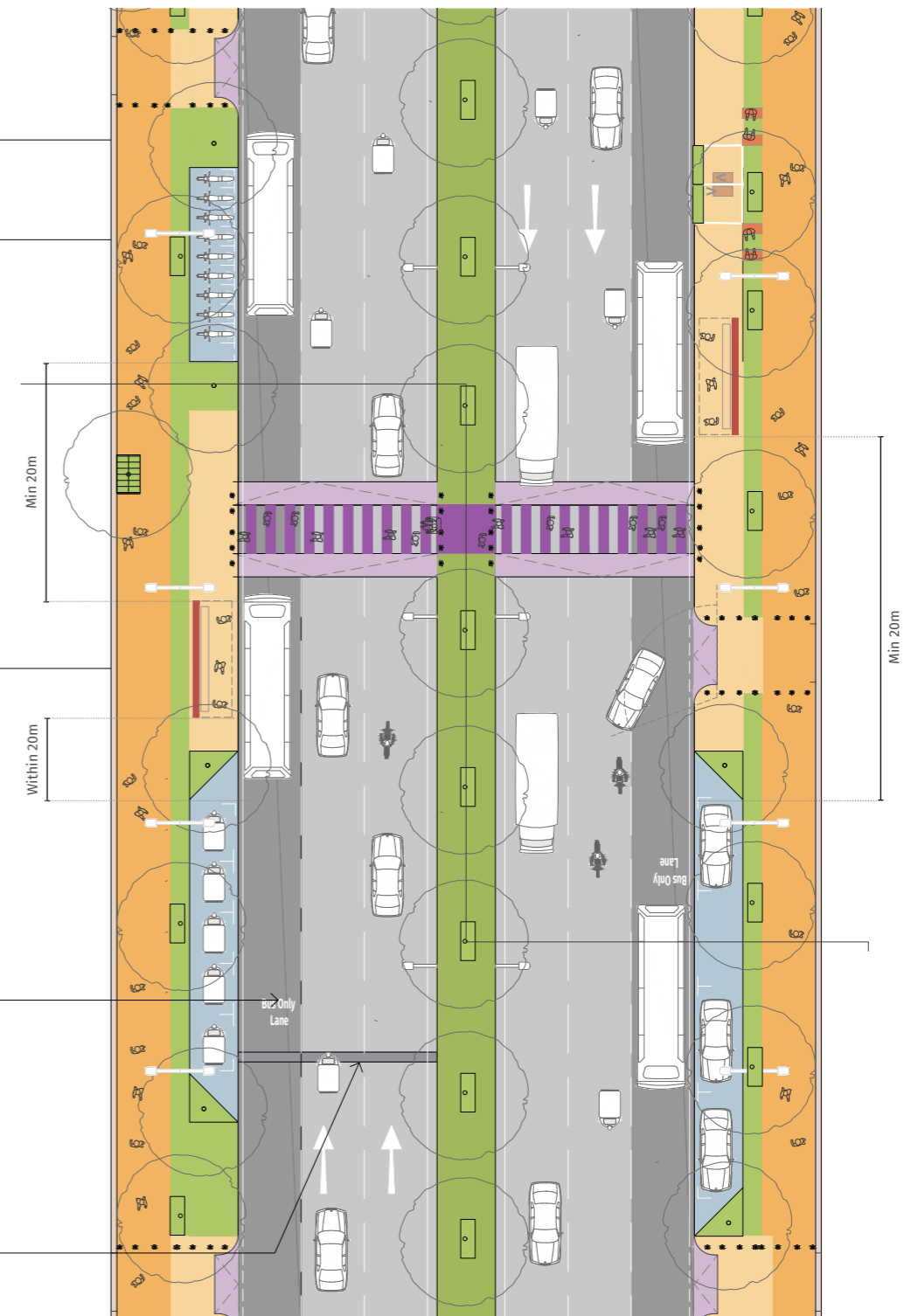
Tree Pit
level +150mm

Street Light

Bus Stop

Bus Only Lane
delineated with road marking

Speed Hump



1d 45 m RoW

Arterial Road

4 lane with Metro Corridor & Segregated Cycle Track

This template is well suited for arterial roads. Metro station entrances should be planned ensuring unobstructed clear walking zone of minimum 2m.

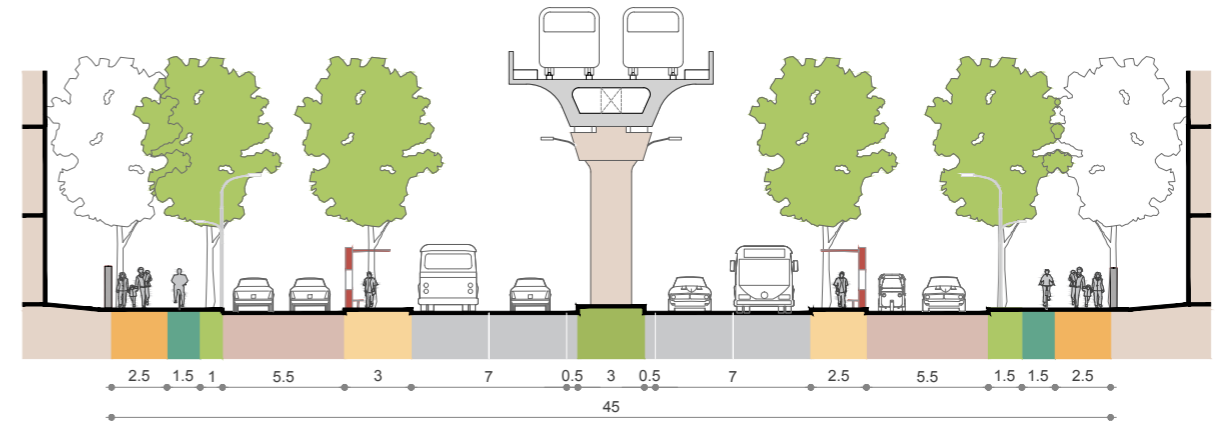
Examples of 45m wide roads in Thoothukudi include NH 138 - Thoothukudi-Tirunelveli corridor.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Metro Corridor
Service Lane	



Tree Pit
grating level +150mm

IPT Parking
accessible only from service lane

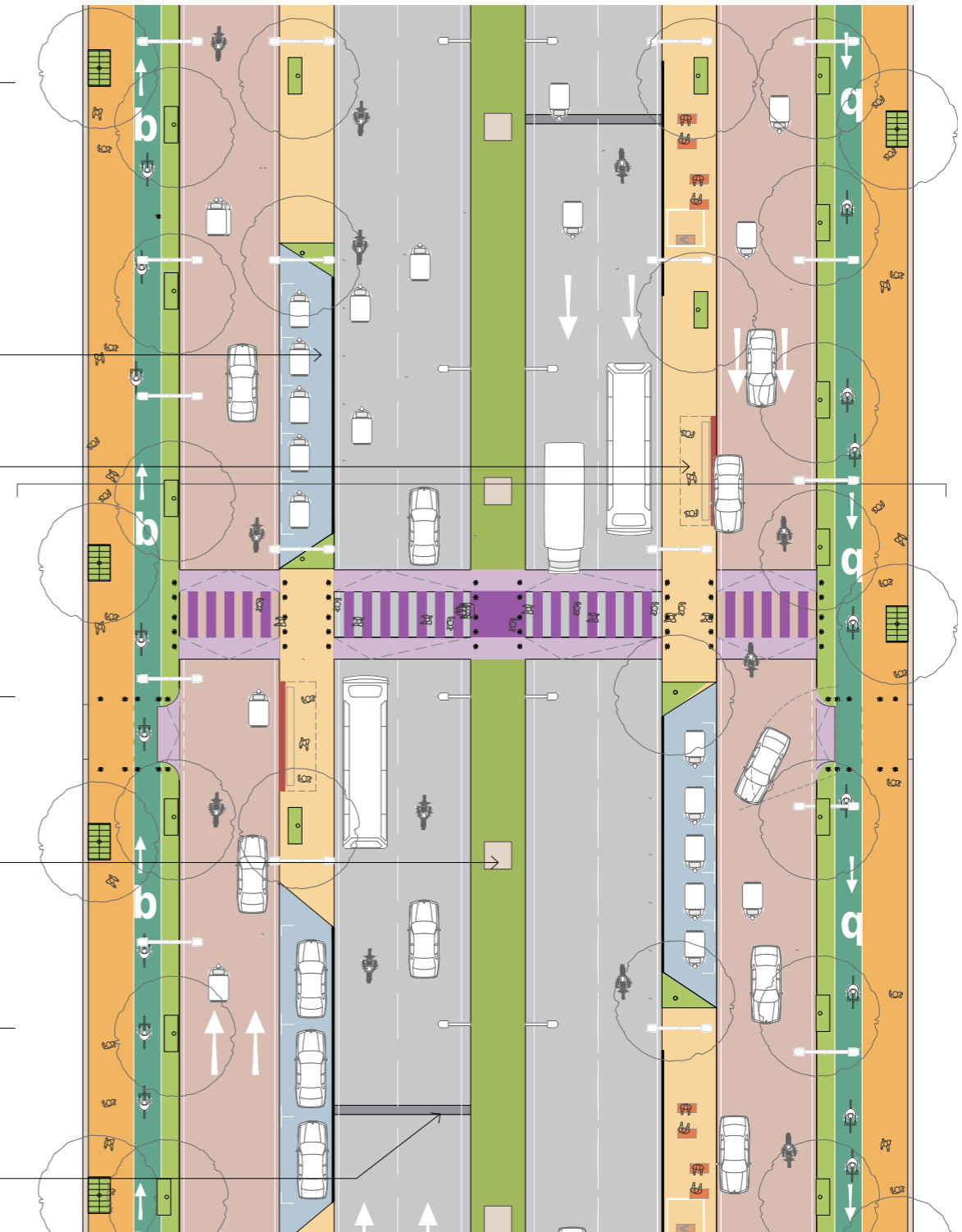
Bus Stop

Tree Pit
level ±0.00mm

Metro Corridor

Street Light

Speed Hump



1c 45 m RoW

Arterial Road

6 lane with Dedicated Bus lane/BRTS

This template is well suited for arterial roads, ensuring efficient transit and a minimum 2m clear walking zone for safe pedestrian access.

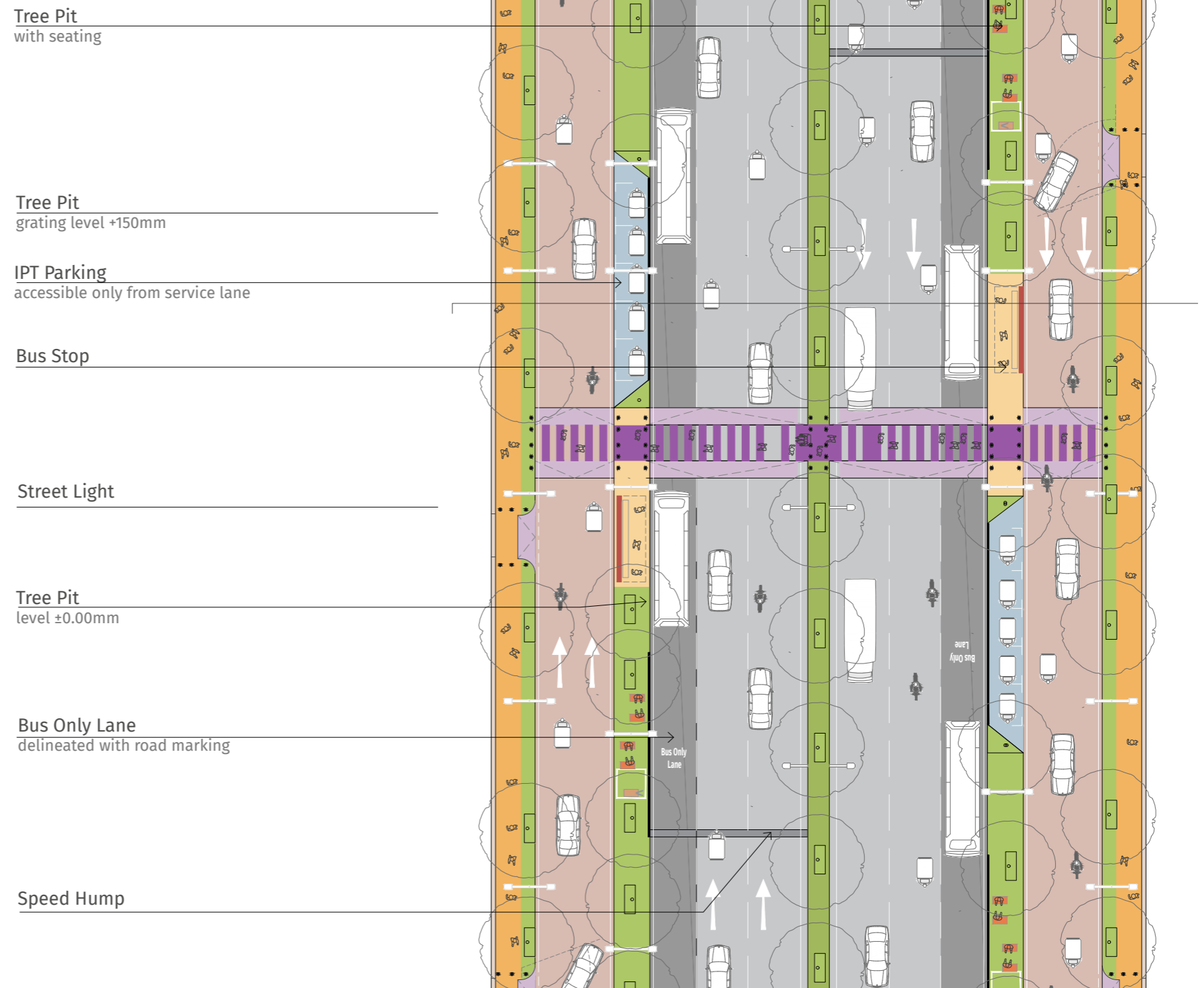
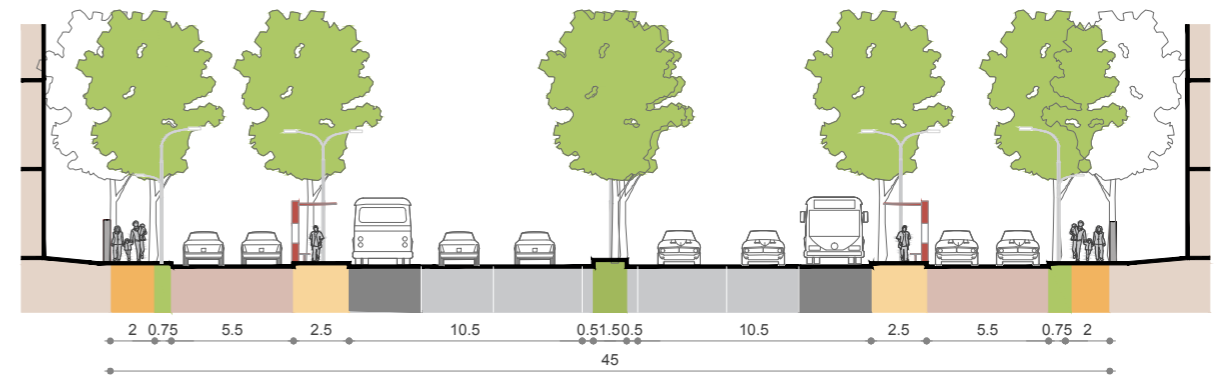
Examples of 45m wide roads in Thoothukudi include NH 138 - Thoothukudi-Tirunelveli corridor.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Dedicated Bus Lane
Service Lane	



1b

60 m RoW

Arterial Road

6 lane with Metro Corridor & Segregated Cycle Track

This template is well suited for mobility corridor with through traffic.

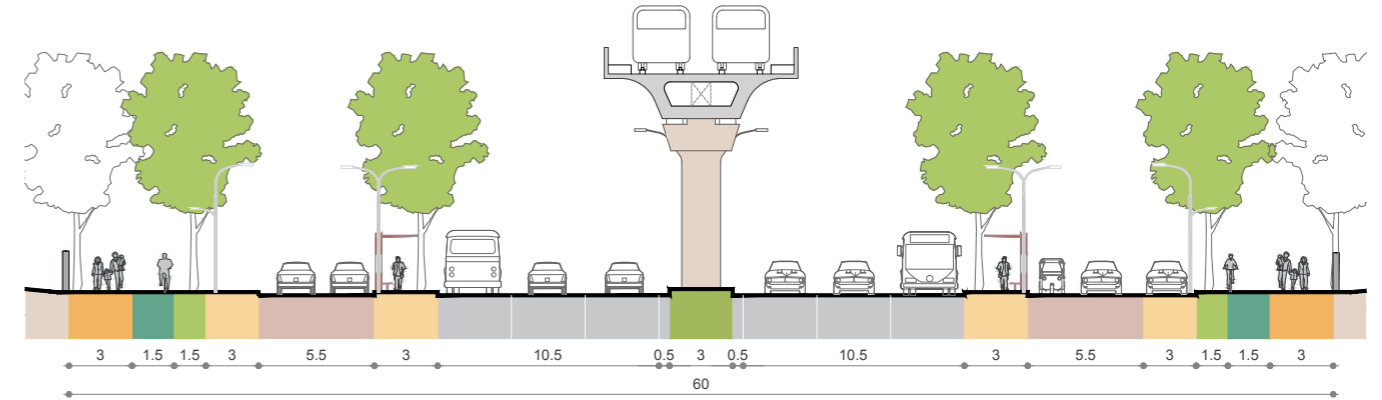
Examples of 60m wide roads in Thoothukudi include the NH 38 - Thoothukudi-Madurai-Vellore corridor and VOC Road.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-Utility Zone	Parking
Public Transport	Metro Corridor
Service Lane	



Tree Pit
grating level +150mm

IPT Parking
accessible only from service lane

Tree Pit
level ±0.00mm

Bus Stop

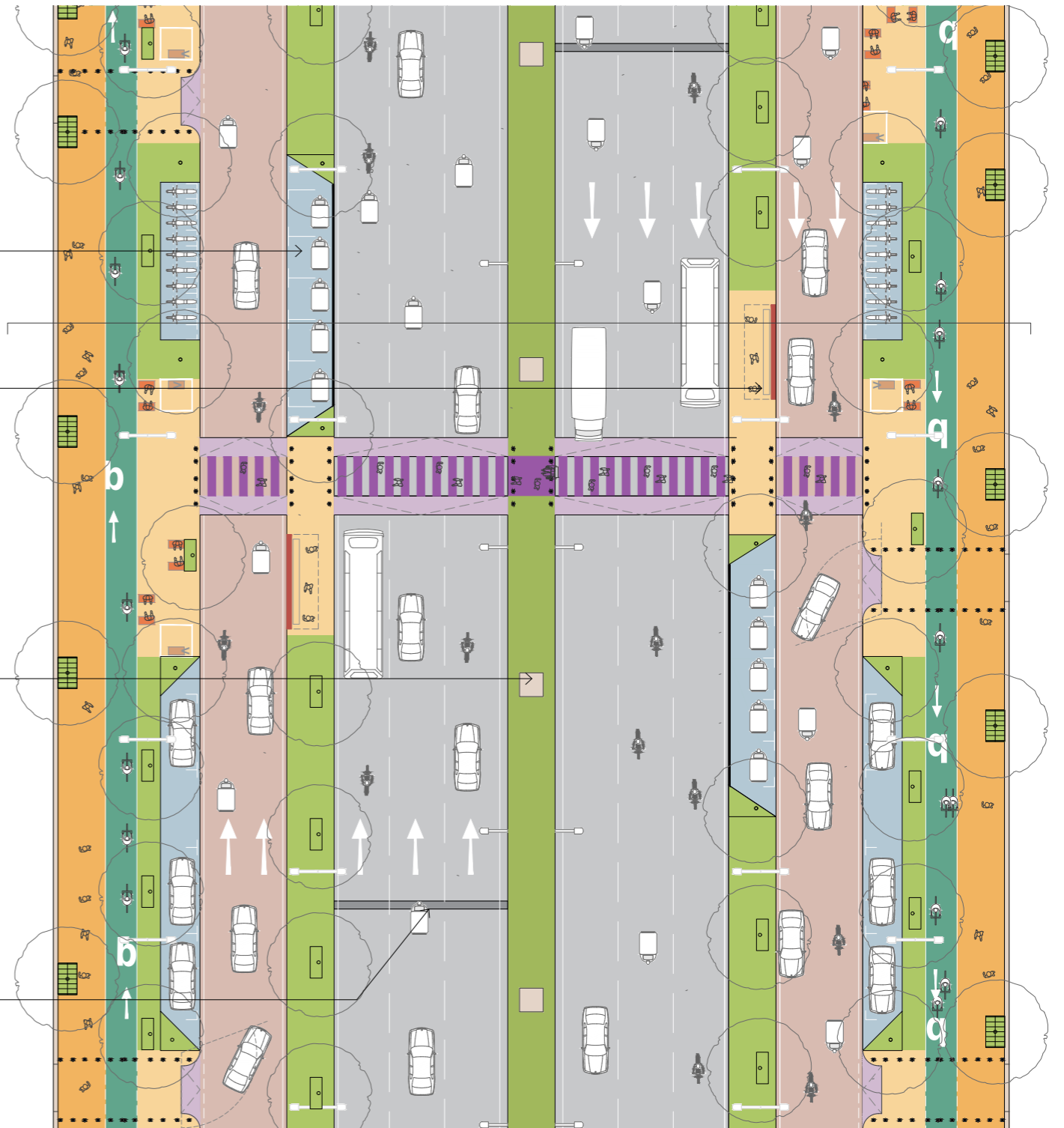
Tree Pit
with seating

Metro Corridor

Street Light

Speed Hump

Property Entrance



1a 60 m RoW

Arterial Road

8 lane with Dedicated Bus lane/BRTS

This template is well suited for arterial roads, ensuring efficient transit and a minimum 2m clear walking zone for safe pedestrian access.

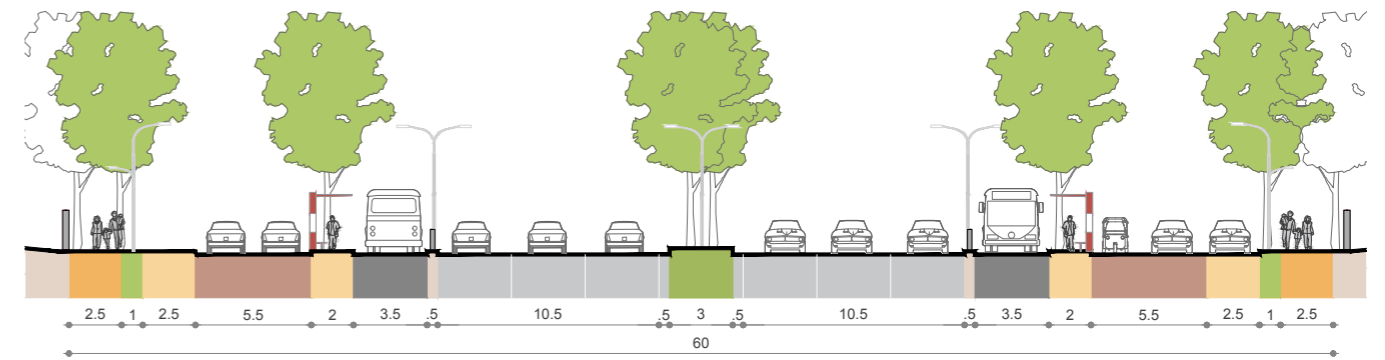
Examples of 60m wide roads in Thoothukudi include the NH 38 - Thoothukudi-Madurai-Vellore corridor and VOC Road.

Adjoining Street's Land-use

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	Median
Cycle Track	Parking
Tree Corridor	Dedicated Bus Lane
Multi-Utility Zone	
Public Transport	
Service Lane	



Tree Pit
grating level +150mm

IPT Parking
accessible only from service lane

Tree Pit
level ±0.00mm

Bus Stop

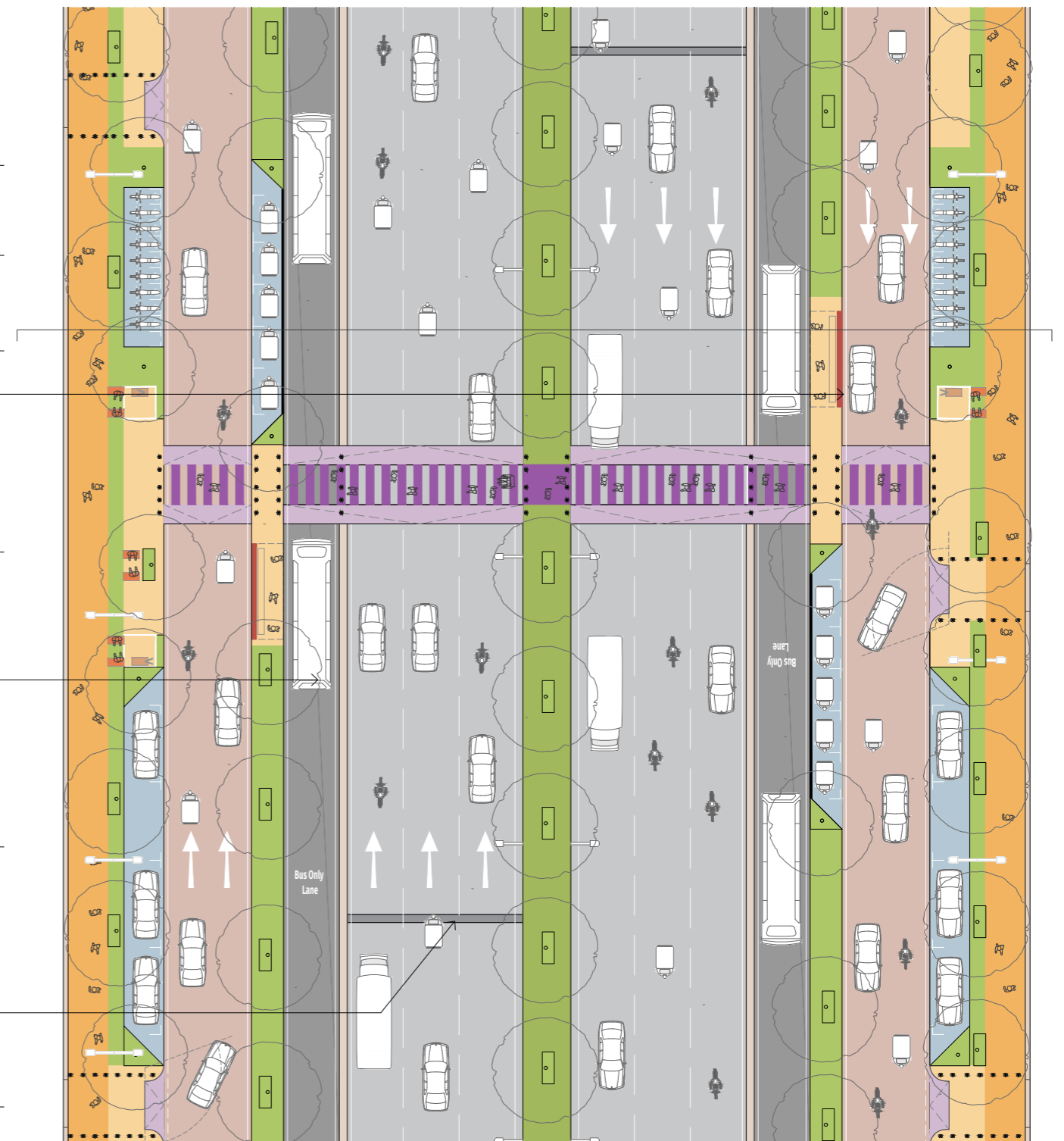
Tree Pit
with seating

Bus Only Lane
segregated with fence

Street Light

Speed Hump

Property Entrance

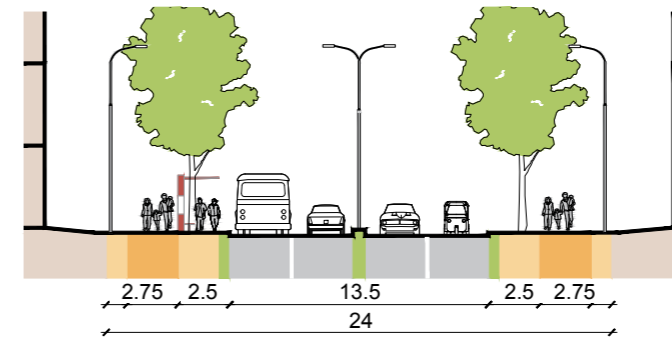


Child Friendly Street Design

Child-friendly street guidelines act as an added layer to the standard ROW templates, applied only in school influence zones. While the base templates ensure uniform street standards citywide, the child-friendly overlay adds targeted safety features—like traffic calming, safer crossings, and wider footpaths—specifically where children walk, ensuring enhanced protection without altering ROW standards elsewhere.

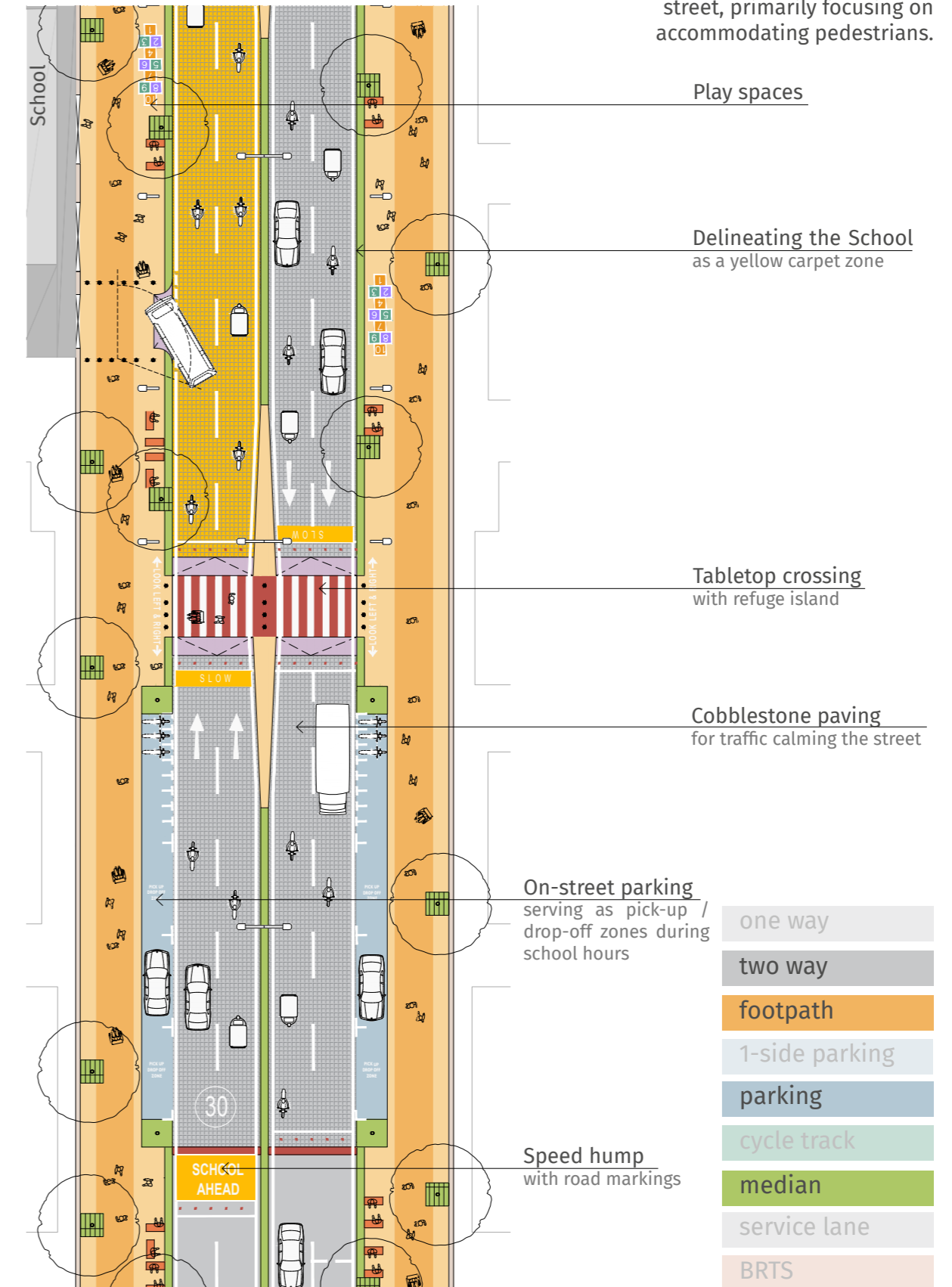


Avvai Shanmugam Street, Chennai (Pilot Safe Route to School Project)



Sample RoW 24m

This is suited for schools present on collector streets with commercial and mixed land-use. It includes wide Footpath on either sides of the street, primarily focusing on accommodating pedestrians.



3.2 Compact and Safe Intersections/Junctions

Intersections or junctions are the focal points of our streets and its activity. Intersection design involves weighing the potentially conflicting goals of safety and vehicle throughput—they are spaces where through movement of vehicles, pedestrians cyclists and public transport, all share the same space. Hence, it is important to design intersections for safety and accessibility of all road users, while giving priority to the movement of public transport, cycles, and pedestrians.

3.2.1 Key Principles of Intersection/ Junction Design

Similar to the principles of Complete Streets, as mentioned in Chapter 4, intersections shall ensure Safety, Mobility and Livability are prioritised.

Safety

- Provide universal accessibility
- Optimise turning radius for reduced vehicular speed
- Introduce refuge islands/ channelizers
- Provide street lines and markings

Mobility

- Segregate movement as per desired directions of travel
- Align travel lanes,
- Enhance throughput
- Segregate and prioritising NMT

Livability

- Provide green spaces
- Introduce elements for comfort (Street furniture)
- Define activity spaces in reclaimed areas

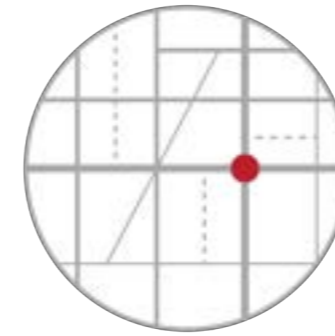
*Developed in collaboration with IBI Groups



Khadi Machine Chowk, Pune; Source : Studio PoD



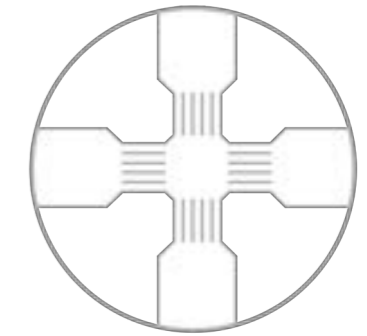
3.2.2. Intersection/ Junction Design Priorities And Design Factors



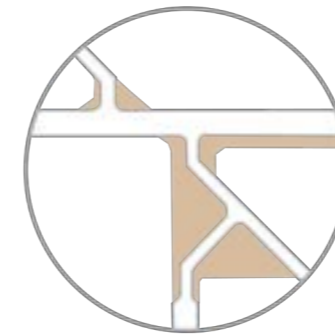
Analyse intersections as part of network



Prioritize safety of vulnerable pedestrians and cyclists



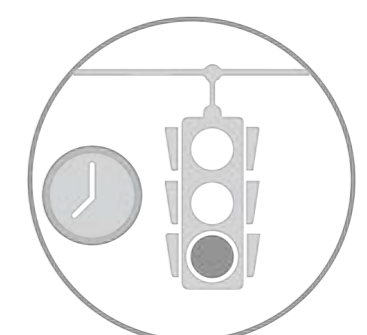
Make intersections compact



Simplify and align the geometry



Integrate Public Spaces



Integrate signal timings with design

Adopted from the NACTO Urban Street Design Guide

Design of Intersection/ Junctions depends on following factors:

Geometric Alignment

The angle and number of intersecting streets determine an Intersection/ Junction's geometry, which directly impact turning movements and pedestrian crossings. In Thoothukudi, intersections often form acute or skewed angles due to the city's organic street patterns. Improving the geometry of such intersections should be prioritized to enhance traffic flow and safety.

Right of Way

The available right of way is a critical factor in intersection design, influencing space allocation for vehicles, pedestrians, and cyclists. Wider roads approaching an intersection often dictate traffic flow, affecting movement from narrower roads. To ensure balanced and efficient mobility, intersections should be designed for optimal right-of-way distribution. Where necessary, widening or reconfiguring intersections should be considered.

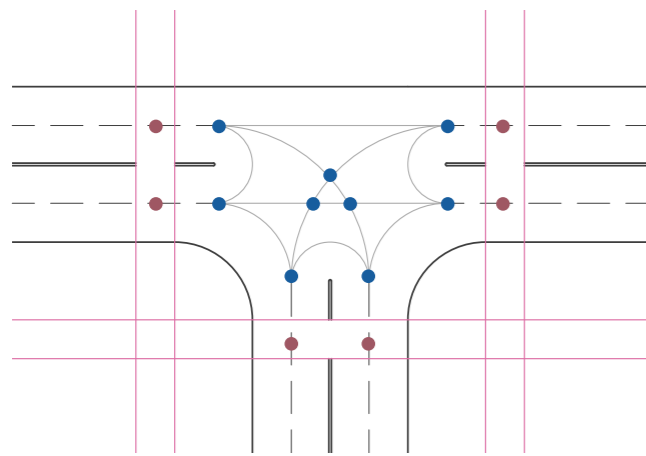
Land Use

The presence of high-activity zones such as schools, temples, hospitals, offices, and markets near major intersections impacts their performance. Multiple access points to adjoining properties can lead to congestion and conflicts. To improve junction efficiency, property access should be strategically planned or diverted where needed.

Traffic Count

The volume of vehicular and pedestrian traffic relative to the street's capacity determines intersection management strategies. The choice between signalized, non-signalized, or roundabout designs depends largely on traffic flow patterns. Intersection planning should incorporate traffic and pedestrian counts, along with network-wide analysis, to minimize pedestrian-vehicle conflicts and enhance safety.

3.2.3 At-grade Intersection/ Junction Typologies

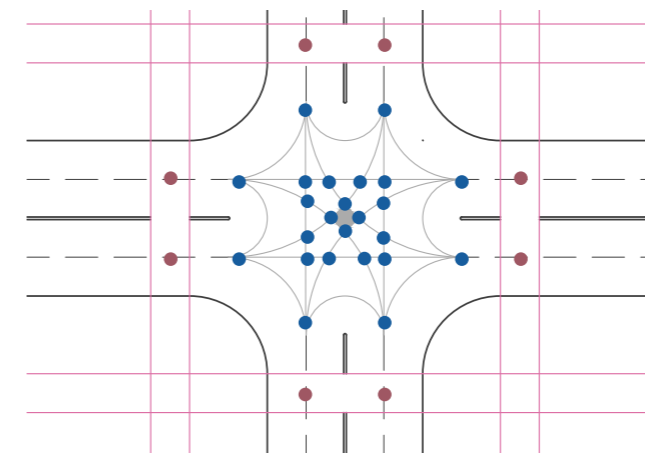


Three-leg Intersection (T-junction)
Connects a minor road to a major road; simple layout with controlled turning movements.

V-V Conflict: 9 P-V Conflict: 6 Total: 15



Bhakthi Circle, Ahmedabad; Source : The Urban Lab

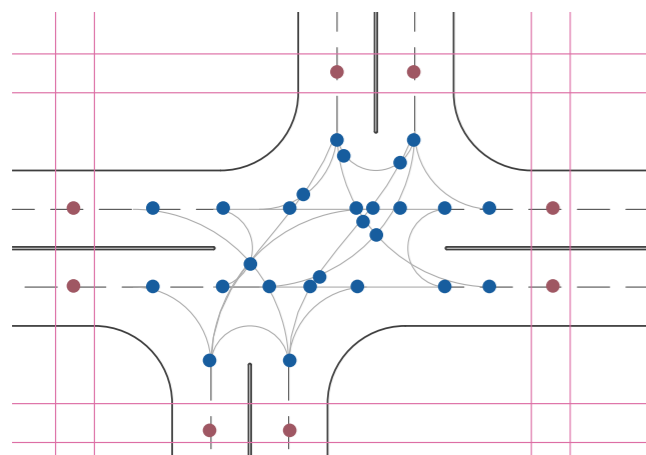


Four-leg Intersection (Crossroad)
Two roads intersect at or near right angles; requires signal control and pedestrian crossings.

V-V Conflict: 24 P-V Conflict: 8 Total: 32



Karnavati Junction, Ahmedabad; Source : The Urban Lab



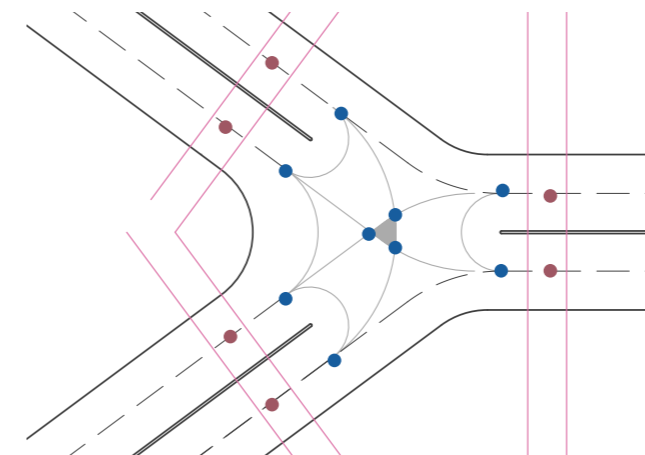
Staggered Intersection (Offset T-junctions)

Two closely spaced T-junctions offset to reduce direct conflict between opposing traffic.

V-V Conflict: 26 P-V Conflict: 8 Total: 34



Karla Phata, NH 48, Maharashtra



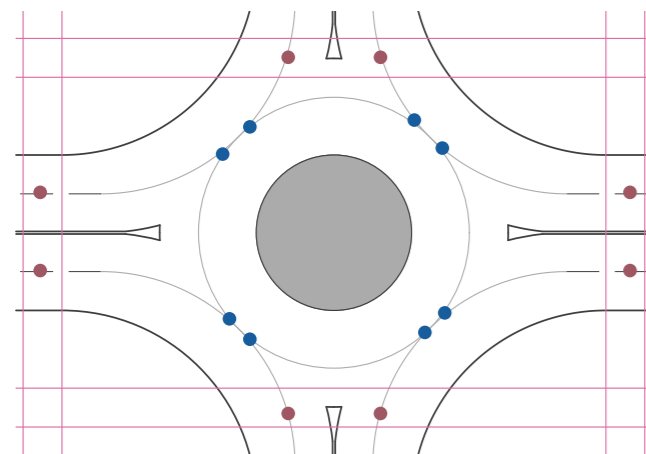
Y-intersection

Formed by roads meeting at an acute angle; needs careful geometry and visibility management.

V-V Conflict: 9 P-V Conflict: 6 Total: 15



Kankaria Junction, Ahmedabad; Source : The Urban Lab



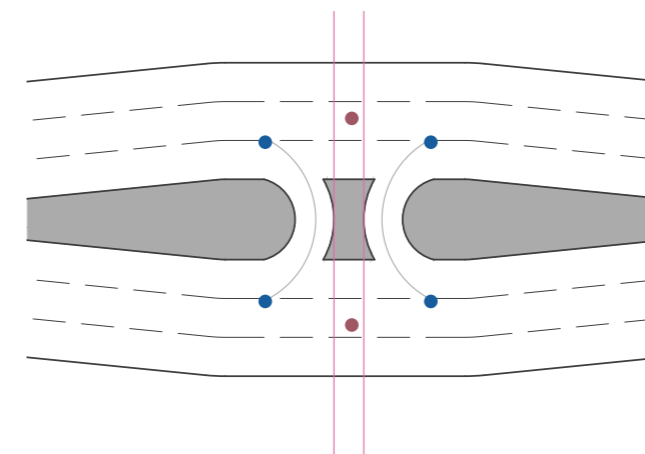
Roundabout / Rotary:

Vehicles circulate around a central island, reducing speeds and conflict points.

V-V Conflict: 8 P-V Conflict: 8 Total: 16



Madhavaram, Chennai; Source : MapCarra



Mid-block U-turn:

Median opening allowing safe vehicle turnaround between intersections, easing junction conflicts.

V-V Conflict: 4 P-V Conflict: 2 Total: 6



Vasant Kunj, Delhi; Source : wildfilmsindia, YouTube

Intersection/Junction Templates

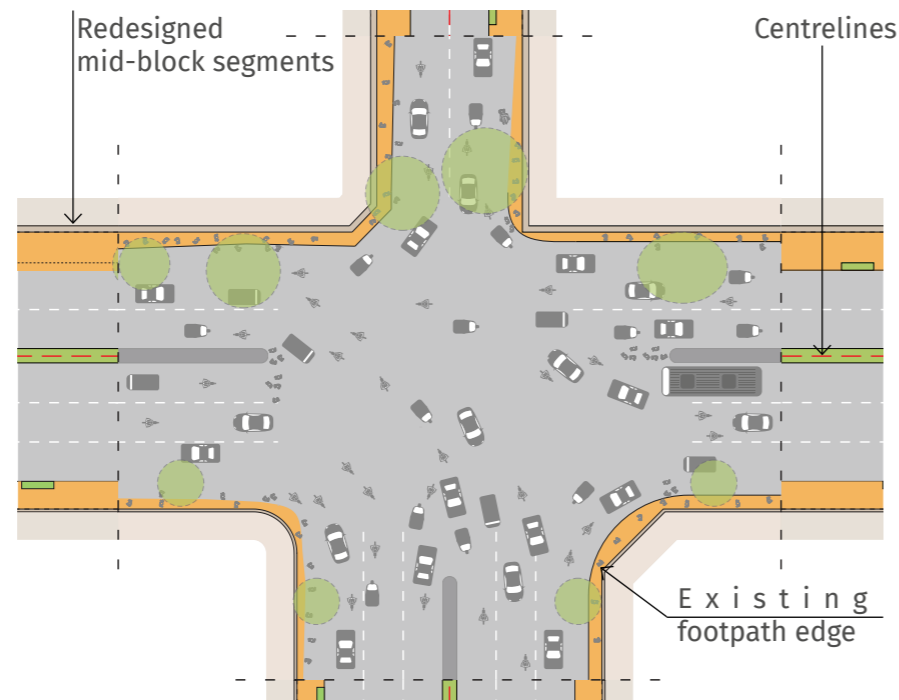
Intersection design aims to minimize conflicts between road users, enhance vehicle flow, and ensure safety. They should be designed in compact layouts that require pedestrians to cross in smaller sections. This design also effectively guides traffic and enhances vehicle throughput. Intersection design template may vary based on no. of lanes, traffic intensity at junction.

For further details refer to IRC 65 and 92

Step 1

Prepare a drawing of the intersection to be redesigned, highlighting the conflict points. Ensure that the footpaths and medians have been demarcated as per current site situation.

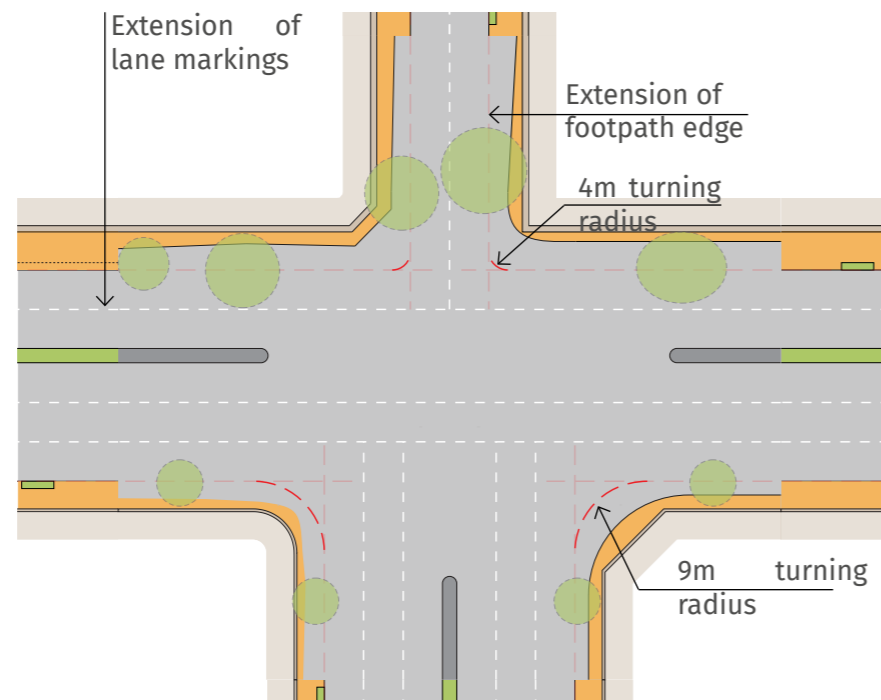
Overlay the redesigned mid-block segments of all the arms of the intersection on the existing intersection drawing such that the centrelines align.



Step 2

Extend the footpaths and the lane markings from the mid-block segments into the intersections to retain a uniform carriageway width.

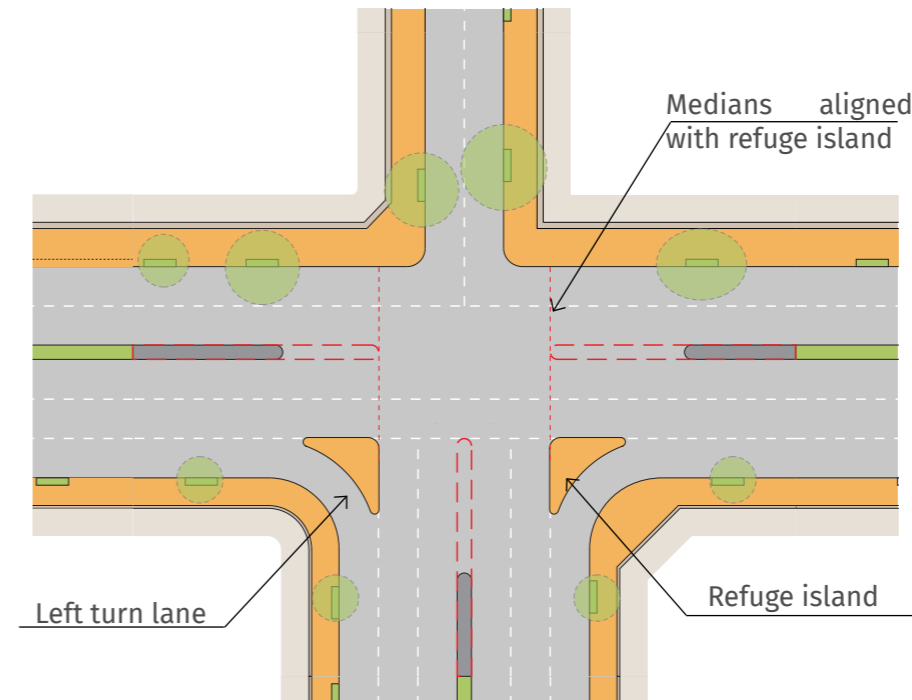
Provide sufficient turning radii. The turning radius should preferably be a maximum of 9 m for Bus Route Roads (BRR) and 4m for non-Bus Route Roads.



Step 3

Where continuous flow of traffic has been observed, provide a left turning lane. Introduce a triangular refuge island to ensure pedestrian safety.

Extend the medians into the intersection, up to the traffic islands. This would prevent wrong side driving and ensure safety of pedestrian crossings.

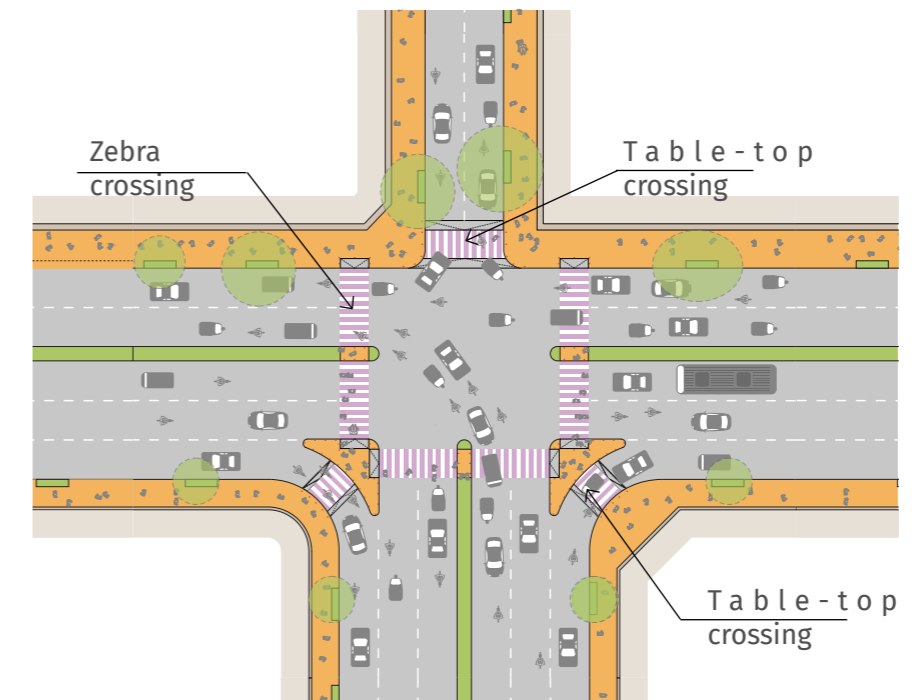


Step 4

Provide at-grade zebra crossings with pedestrian access ramps across all signalised arms of the intersection.

Unsignalised street junctions should have tabletop crossings.

Provide bollards to prevent vehicular entry into footpaths and provide unhindered pedestrian refuges in the medians and islands.



Roundabouts

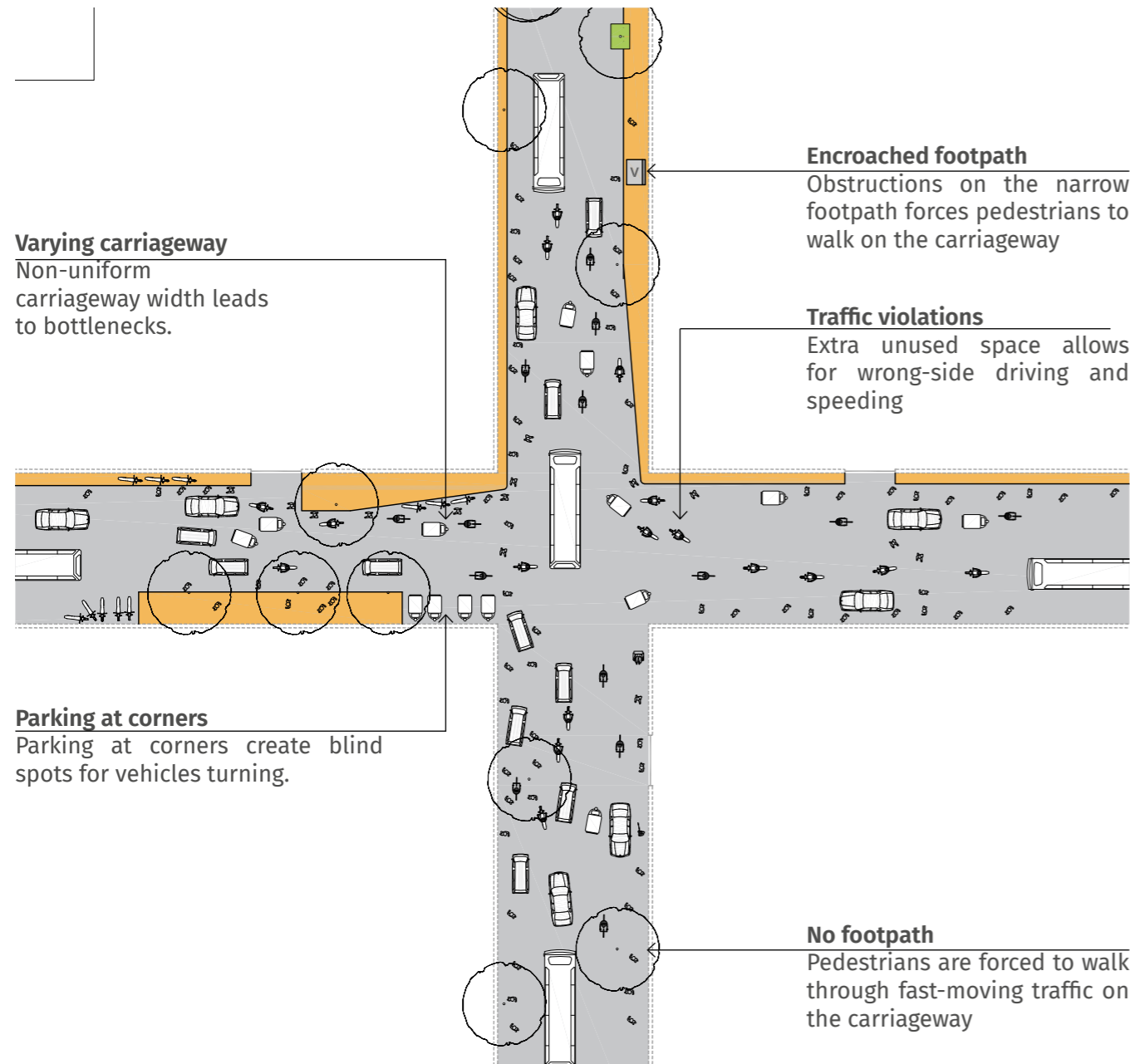
Roundabouts serve to minimize conflicts among road users. Their design encourages a continuous, circular flow of vehicles, reducing the need for stops and sharp turns.

In unsignalised intersections, a roundabout can improve safety and reduce speed at an unsignalised intersection.

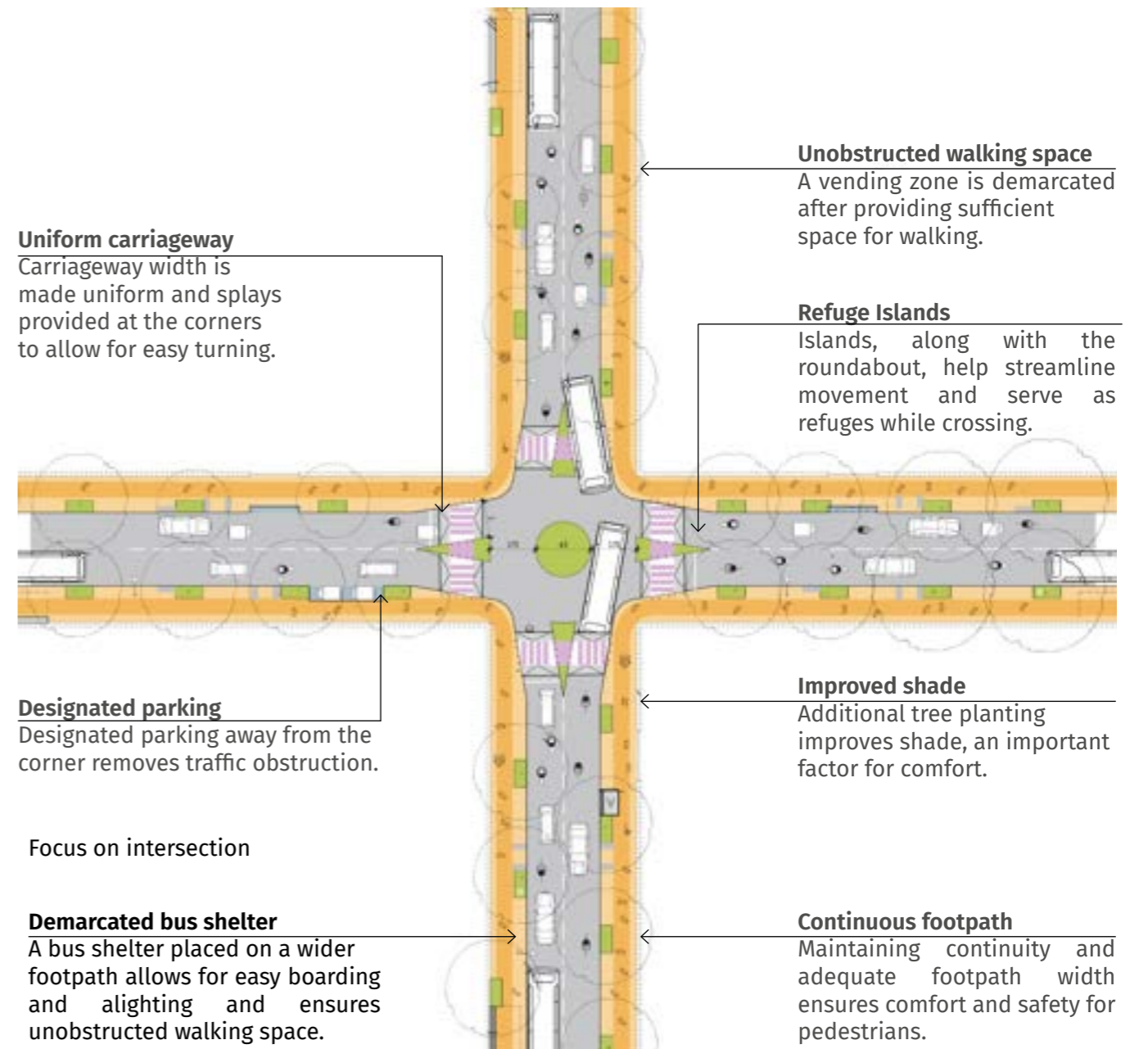


Pantheon Road Junction, Chennai

Before



After



Complex Intersection/ Junction

This example represents a busy arterial highway branching off into an arterial road and a local one-way street while also meeting a four-lane street and another local street at angles, forming a complex X-intersection.

Often, streets in an organically formed urban setup meet at angles, forming non-orthogonal intersections. Creating perpendicular angles where possible and making the space compact by public plazas, significantly enhances the safety and liveability of the intersection.

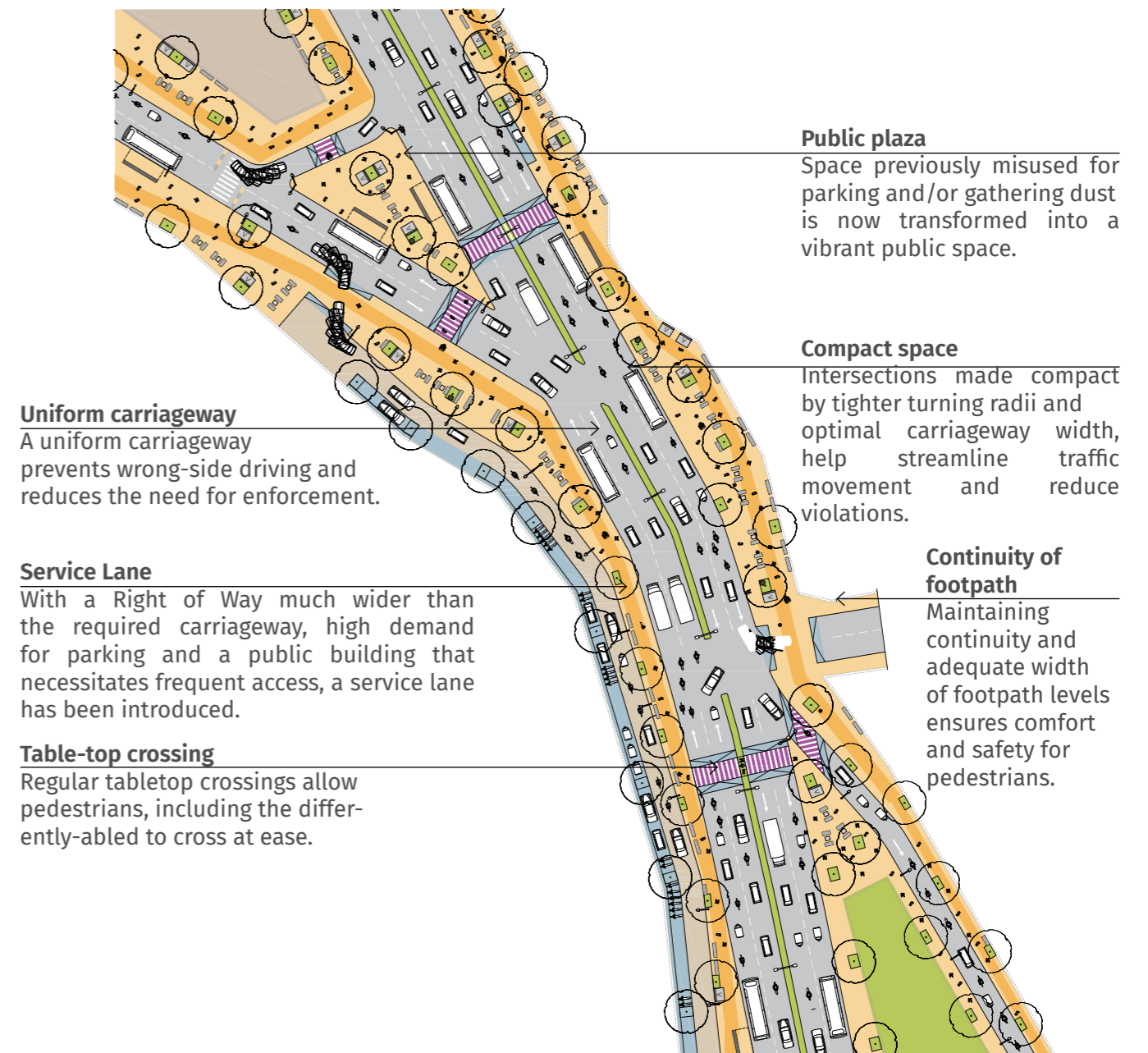


Buenos Aires, Argentina

Before



After



3.3 Road Marking and Signage

Road markings and signage are critical to any street design because they translate the design into real-world user behaviour—guiding movement, reinforcing right-of-way, minimising conflicts, and ensuring that all street elements function safely and intuitively. Without them, even well-designed streets become confusing, unsafe, and difficult to navigate

As per IRC 35

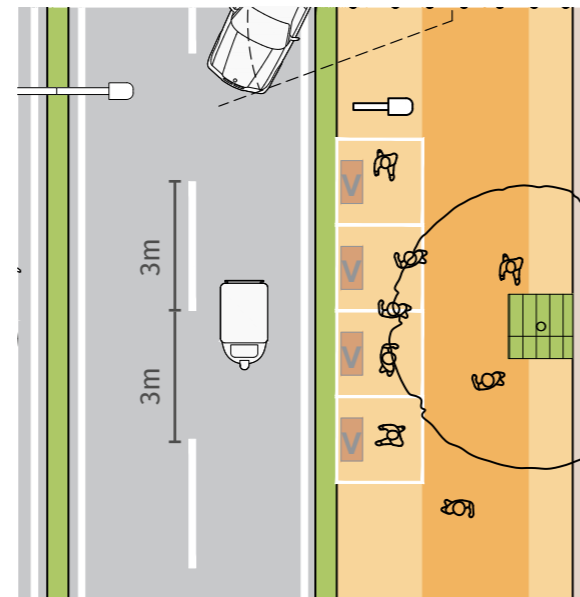
3.3.1 Road Markings

1. Longitudinal Marking

The longitudinal marking is generally provided along the traffic movement. It is used to guide movement and regulate overtaking.

Continuous (solid) line	No overtaking allowed
Broken line	Overtaking permitted when safe
Double solid line	Strictly no crossing
Solid + broken line	Traffic on the broken side can cross; solid side cannot

Width of Marking	150 mm in urban areas
Gap:	Line ratio: 2:1 6m gap : 3m mark In warning areas 1:1 3m gap : 3m mark (Preferred in Core areas)



Usage of 1:1 Longitudinal Marking

2. Transverse Markings

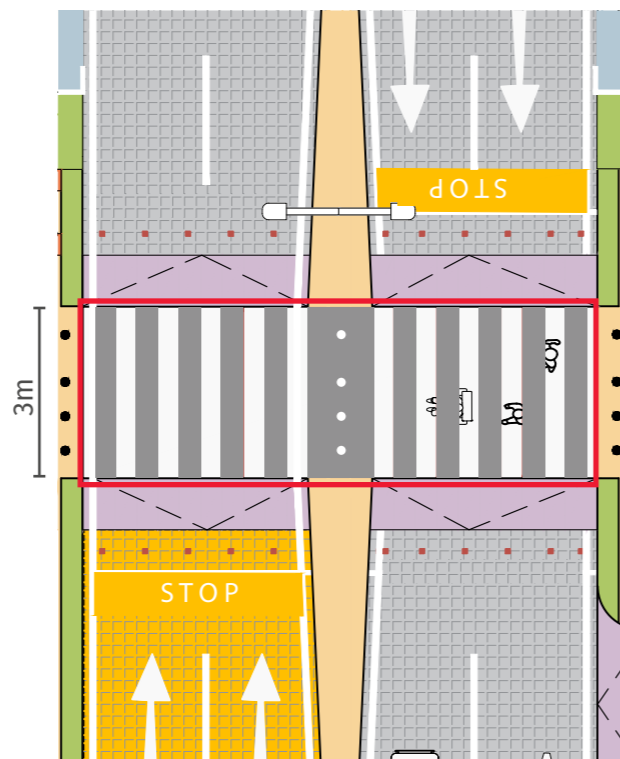
The Transverse markings are provided across the carriageway for traffic control with single/ double continuous lines such as Stop marking and Give way marking.

Stop Line:	200–500 mm
Width of Marking	1–3 m before pedestrian crossing
Placement	

Give Way Line (Yield):
Two broken lines laid side by side and supplemented by the hollow triangular Give Way approach marking.

Width of Marking	200mm
Gap	600 mm line segments; 300 mm gaps.

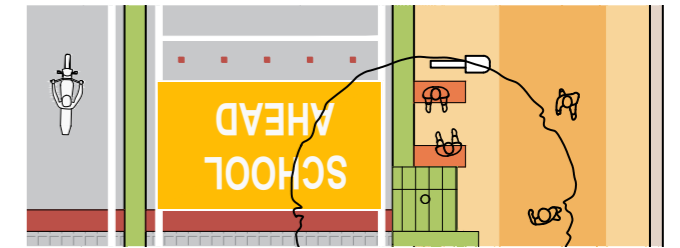
Pedestrian Crossing (Zebra)	
Stripe width	500 mm
Gap	500 mm
Crossing width	minimum 2.5 m (urban), recommended 3–4 m near metro/bus hubs/schools



Usage of transverse marking - Pedestrian Crossing

3. Word messages and Symbols

Examples	"SCHOOL", "SLOW", "STOP" Restricted parking symbols
Letter height	2–3 m on urban streets for legibility



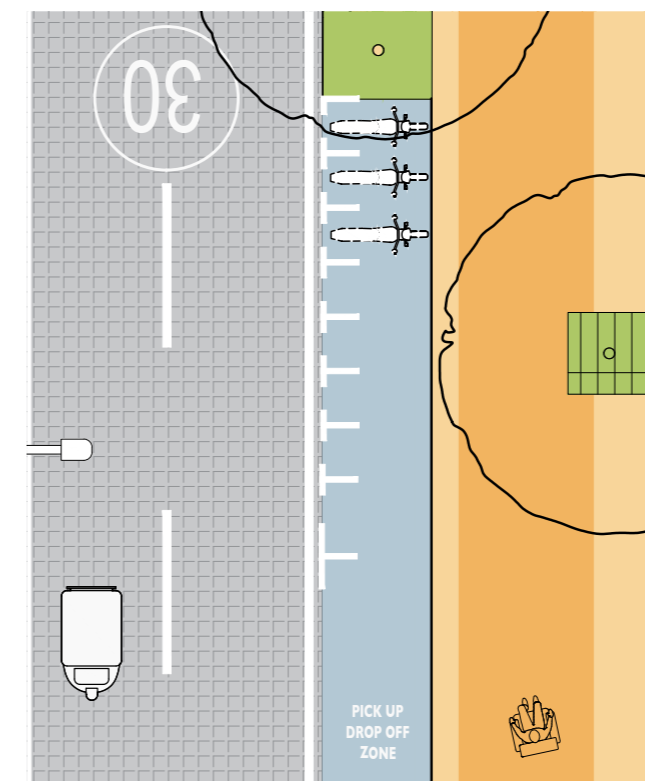
4. Hazard Markings

Placement Obstructions (islands, medians, gore areas), Merging/diverging sections

Marking Diagonal stripes sloping downwards towards the direction of travel.



Road Marking at Kuthambakkam Junction, Chennai



5. Parking Markings

Marking	Rectangular parking bays
Width of bay	2.5 m for cars
Length of bay	5 m for cars
Accessible parking:	Special symbol as per IRC:35 & MoRTH norms

6. Speed Reduction Markings

Marking	Transverse bars • Optical speed bars
Placement	Near schools, sharp curves, bus bays.

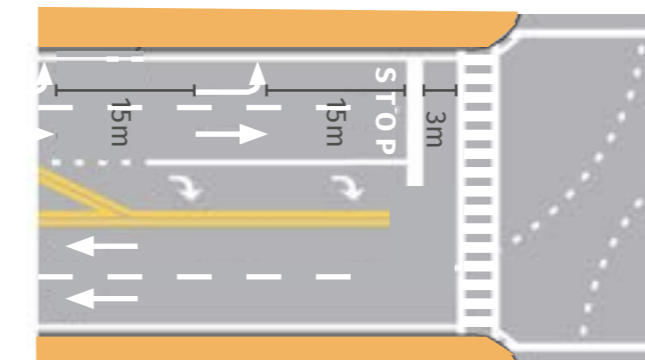
7. Border / Edge lines

	Used to indicate end of carriageway
Marking	Single continuous white line
Placement	150mm – 200mm from edge

Continuity line shall be used across the mouths of side roads

For details on arrow marking, bus stop marking, block marking and Directional Marking refer IRC 35: 2015

8. Intersections/ Junctions



Mandatory markings:

- Marking for traffic control
- Lane demarcating markings
- Diagonal and Chevron Markings
- Directional arrow markings & word messages
- Hatch Markings/Ghost Island
- Prohibitory markings
- Pedestrian crossings

Material for Road Marking Thermoplastic (recommended) |
Glass beads 250–400 g/m²
 Cold paint is allowed for low-volume streets, but to be avoided on major arterials

Color
White regulatory/centerline
Yellow separation of opposing flows, no-parking zones
Black & white for kerb markings

3.3.2 Signage

A. Types of Signs

As per IRC:67–2022, road signage shall follow standard specifications for design, colour, size, and placement. The code classifies signs into three main categories: Mandatory/Regulatory, Cautionary/Warning, and Informatory Signs.

1. Mandatory / Regulatory Signs

Speed limit | No parking | One-way | No entry

Shape Circular
Color Red border + white background
Dimension 600 mm diameter



Priority for one direction traffic



No Entry



No Parking



Speed Limit



No Right Turn



No Halting or Stopping



Height Limit



No U-Turn



All Motorised Vehicle prohibited



Compulsory Left Turn

2. Cautionary / Warning Signs

Pedestrian crossing | School zone | Curve | Narrow road

Shape Equilateral triangle
Color Red border + white background
Dimension 600mm | side of triangle



Right Hand Curve



Pedestrian Crossing



Cross Road



Gap in Median



School Ahead



Traffic Signal

3. Informatory Signs

Parking | Bus stop | Metro station | Hospital | Wayfinding signs

Shape Rectangle / Square
Color White border + Blue background
Dimension Typically 600 mm x 450 mm or 800 mm x 600 mm depending on speed environment



Bus Stop



Parking on both sides

B. Placement Guidelines

1. Height (Bottom of signboard)

Urban: 2.1 m (minimum)
Pedestrian-heavy zones: 2.1–2.5 m
On medians: 1.5 m
Carriage way: 4.5m

2. Lateral Clearance

Distance from Kerb 0.6–1.0 m
 Avoid blocking pedestrian clear width

3. Advance Placement Distance

For <50 km/hr urban speeds,

Placement 30–50 m before conflict point
School zone 100 m in advance



C. Material for Signboard

- Retro-reflective sheeting (as per Type IV/V/X)
- Aluminum sheets with anti-rust treatment
- Night visibility requirements as per IRC:67 Table 6



3.3.3 Way finding around School Zones

Road Markings

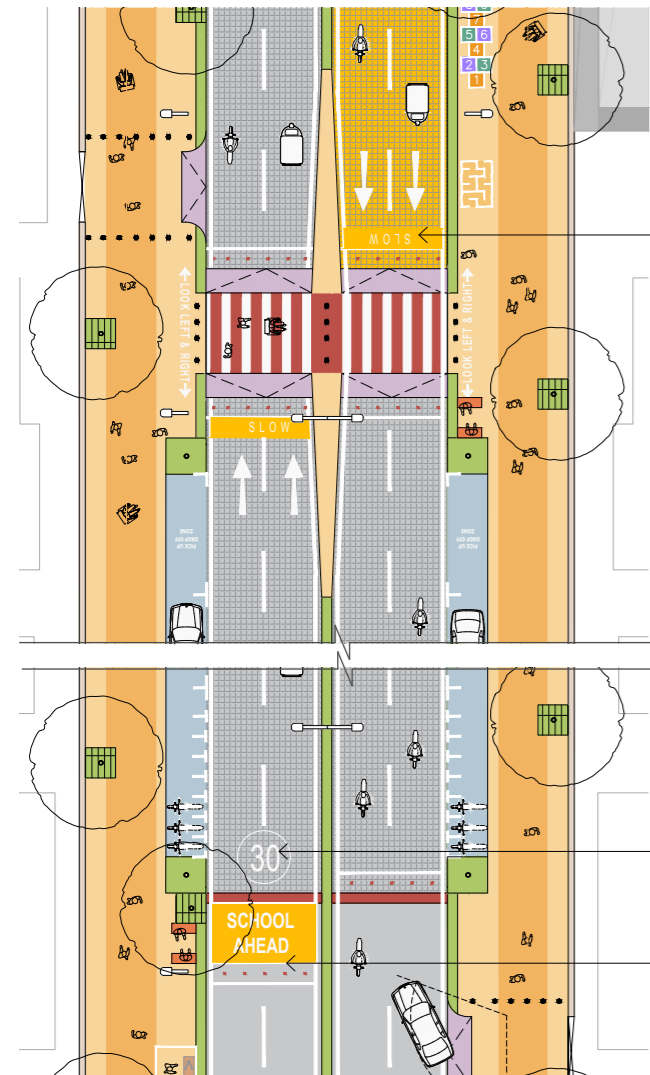
Road markings such as “SCHOOL AHEAD” and “SLOW” remind motorists to yield to pedestrians.

The road marking “SCHOOL ZONE” shall be demarcated on streets where the boundary of the School Zone starts—500m radius around the school.

“PICK-UP / DROP-OFF” zones shall be clearly defined by the appropriate road markings.

Additionally, the desired speed limit shall be demarcated on the carriageway.

Spacing of road markings shall adhere to standards as per IRC:35 and IRC:32.



SLOW Road Marking

“SLOW” is to be marked before the table top and other traffic calming elements, closer to the school entry/exit gate.

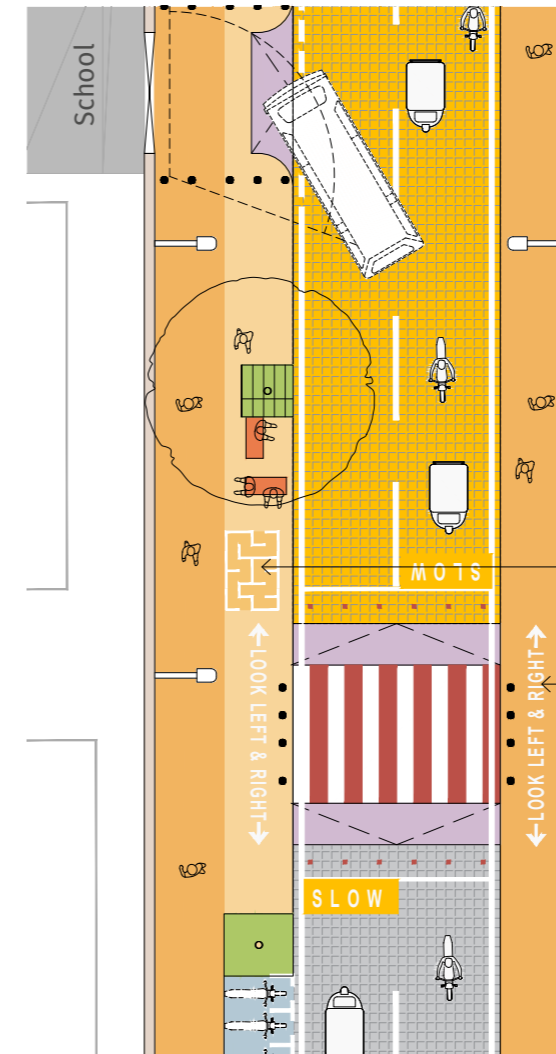
Street Speed Limit

These shall be demarcated after the “SCHOOL AHEAD” marking and at intersections.

SCHOOL AHEAD Road Marking

These shall be demarcated at least at a distance of 100 m on either side of the school gate

Footpath Markings



Consistent way-finding, using arrow markings, shall be provided around transit stations, mid-block crossings, intersections, pick-up/drop-off locations, and play areas to help children, especially those with disabilities, understand information.

Signage shall be stamped on the footpath, in addition to the signboards, to guide children.

Markings such as “LOOK LEFT/LOOK RIGHT” shall also be stamped on the Footpath at pedestrian crossings.

Play Spaces Painted

LOOK LEFT/LOOK RIGHT Marking



Signage

Signage shall be installed within the School Zone to identify speed limits, parking and no-parking zones, pick-up/drop-off zones, pedestrian crossings, etc.

Signage for pedestrians and motor vehicle drivers must be prioritised equally and designed with their speeds and heights in mind.

All signage must be written in the local language to ensure easy understanding by all citizens.

Spacing of signage shall adhere to the standards per IRC SP:32 and IRC:67.



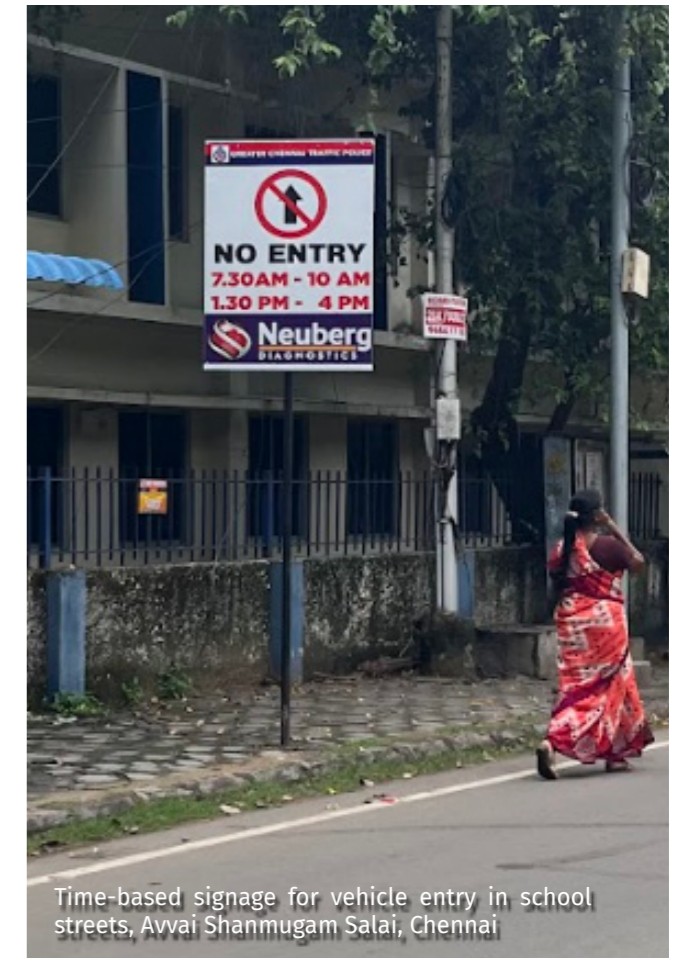
Vittal Malya Road, Bengaluru

Pick-up / drop-off zones

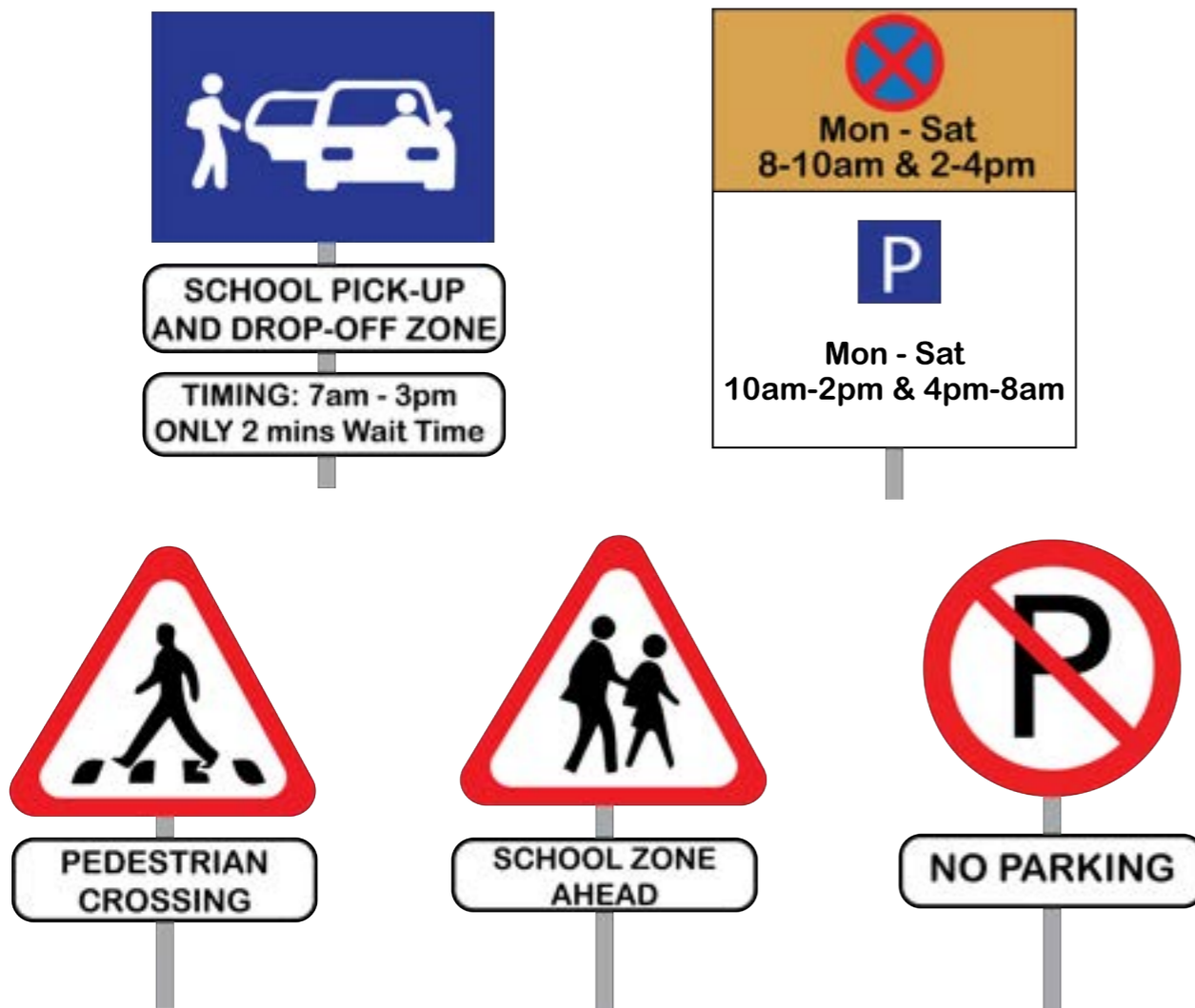
Appropriate kerb striping and signage must be provided to delineate the pick-up/drop-off zones.

Signage must also specify the permissible timings for pick-up/drop-off activities, in line with the school start and end times.

The signage and markings shall also indicate the waiting time for pick-up and drop-off and shall not exceed 2 minutes.



Time-based signage for vehicle entry in school streets, Avvai Shanmugam Salai, Chennai



Sample set of signage that is recommended to be provided around schools



Pretend pupils in West Midlands, England, use innovative signage to demarcate no parking and pick-up / drop-off zones around the school.

Image Source: Neighborhood News Online



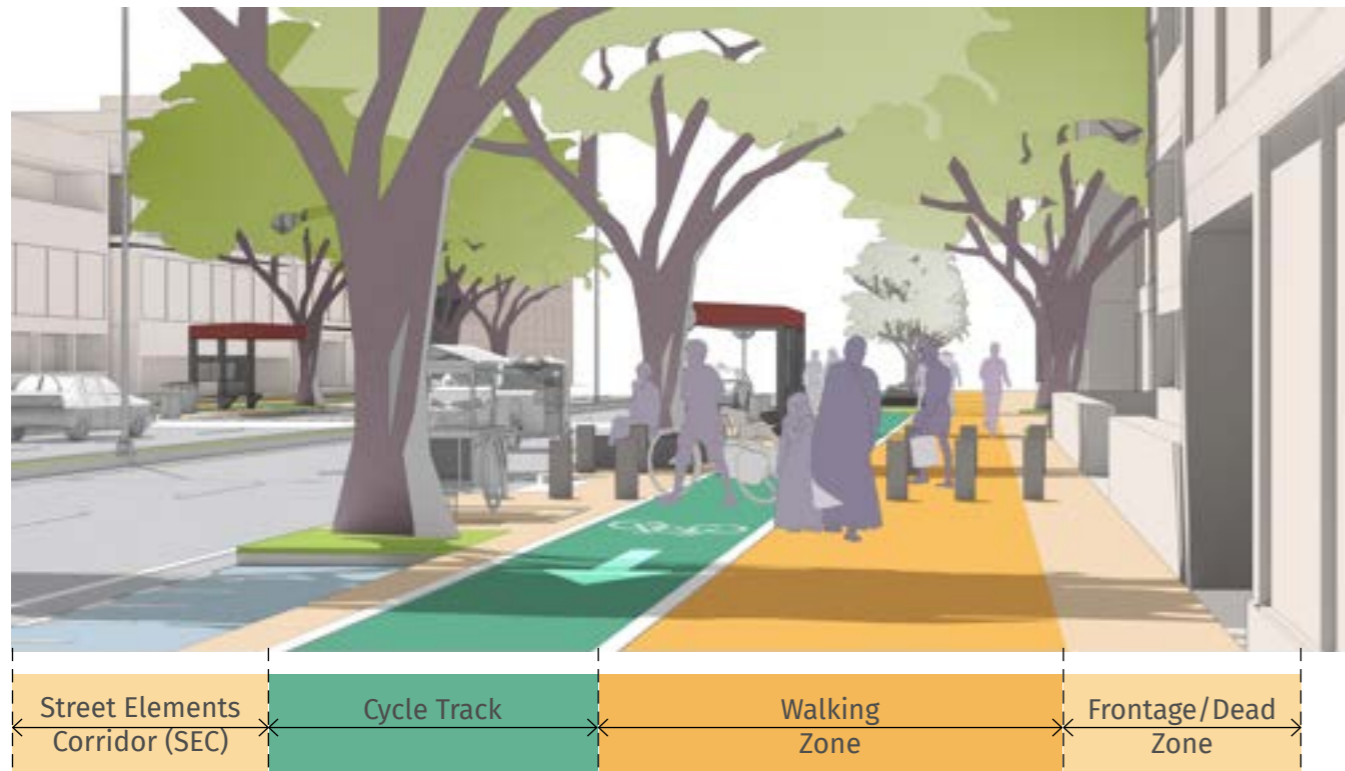
4

Street Design Elements

- 4.1 Footpaths
- 4.2 Cycle Tracks
- 4.3 Pedestrian & Cyclist Crossings
- 4.4 Traffic-calming Measures
- 4.5 Carriageway
- 4.6 Service Lane
- 4.7 Intersection Design
- 4.8 Public Amenities
- 4.9 Street Furniture
- 4.10 Green and Landscape Strategy

4.1 Footpaths

Footpaths are vital to ensure people can walk safely and comfortably. Segregated footpaths enhance connectivity, improve safety & comfort, and ensure accessibility for all pedestrians, including people of all genders, ages, and abilities. They activate streets and boost businesses by providing places for people to walk, stop, sit, meet, talk, shop and eat.



4.1.1 Footpath Zones

Frontage/dead zone

Space adjoining the property edge that acts as a buffer from the boundary wall and can accommodate any spill-over activities, such as a waiting crowd at shops. It allows for an unobstructed walking zone.

Walking zone

Continuous one-level walking space, free of any obstructions, and ensuring a clear height of 2.4m above the finished level of the footpath throughout. Walking Zone includes Frontage One.

Street Elements Corridor (SEC)

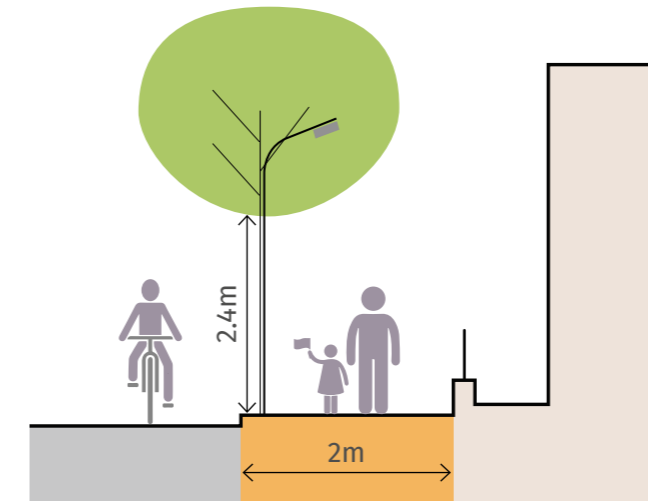
Space to provide facilities like street furniture, bus stops, IPT (Informal Public Transport) stands, landscape, children's play equipment, street signage, street lighting, telecom and electric boxes, on-street vending, on-street parking, and other public utilities.



Aundh-Ravet Road, PCMC

4.1.2 Width

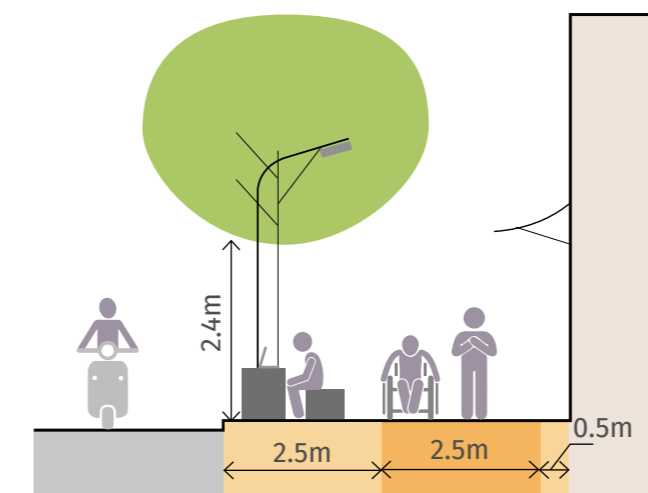
Streets are categorised as arterial, sub-arterial, collector, and local streets; however, footpath widths shall be determined based on the street's land use. For example, commercial streets require wider footpaths than residential streets to support pedestrian movement and activities. For a comprehensive understanding of standards to follow based on land use, Right of Way (RoW), and street typologies, refer to Chapter 3—Street Design Templates.



Residential Streets (For RoW ≥ 12m)

Walking zone minimum 2m

For RoWs ≤ 12m Refer Chapter 3.



Commercial Streets* (For RoW ≥ 15m)

Frontage zone minimum 0.5m

Walking zone minimum 2.5m

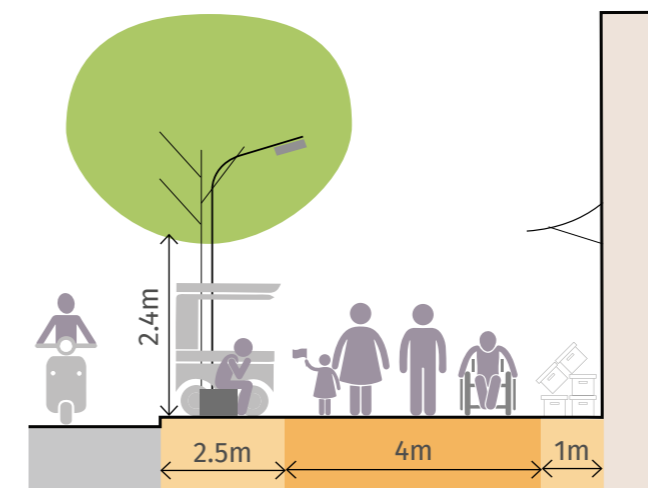
Street Elements Corridor minimum 2.5m

*Streets with shop fronts & offices.

Local streets ≤10m RoW*

Streets with RoW ≤ 10m may be designed as shared streets. SEC can be optional or provided as discontinuous patches.

*For RoWs ≤ 15m Refer Chapter 3.



Transit and Market Streets

Areas such as markets, shopping streets, transit nodes, religious nodes, railway/metro stations, bus terminals, witness a high-intensity pedestrian footfall.

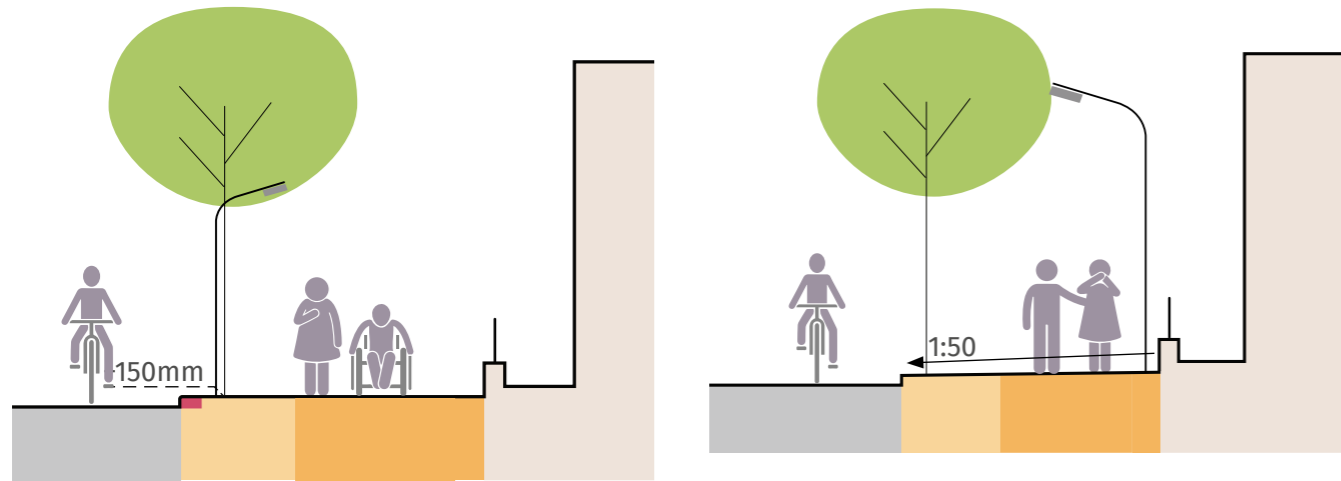
Frontage zone minimum 1m

Walking zone minimum 4m

Street Elements Corridor minimum 2.5m

Based on the availability of alternate routes and RoW width; streets with high-intensity pedestrian footfall can be considered as pedestrian-only streets or pedestrian mall that allows only walking, cycling and public transport.

4.1.3 Height & Gradient



Height

Top of the kerb should be 150mm high from the finished carriageway surface to prevent mounting of vehicles & ensure comfortable walking for all.

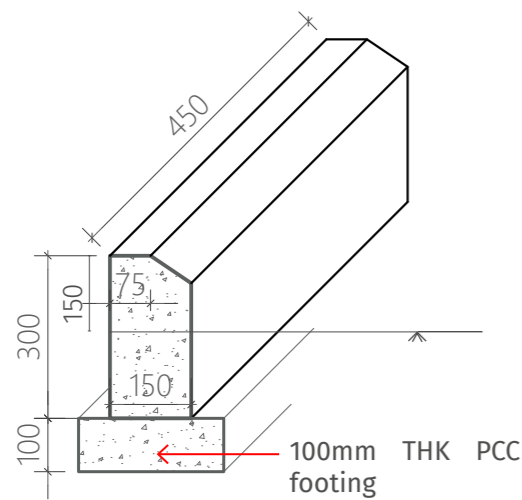
Gradient

Recommended gradient of 1:50* should be maintained for surface runoff.
*Footpath height to be 150mm at kerb edge

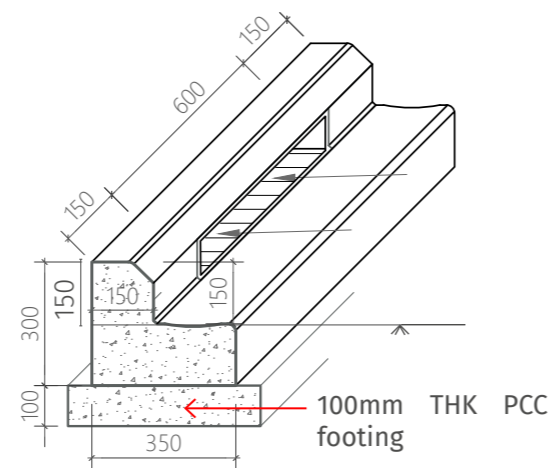
4.1.4 Kerb Details

The final finished height of the footpath is marked by placing kerb stones along the edge. Prefabricated kerb stones are generally preferred over traditional ones as they are stronger, easier to install, and have a uniform finish. Kerbs shall be made of M30 grade concrete.

Saucer drains and openings to catchment pits should be laid along the footpath kerb to channelise and collect stormwater runoff. Saucer drains can also be provided along with the kerb stone as a single unit.

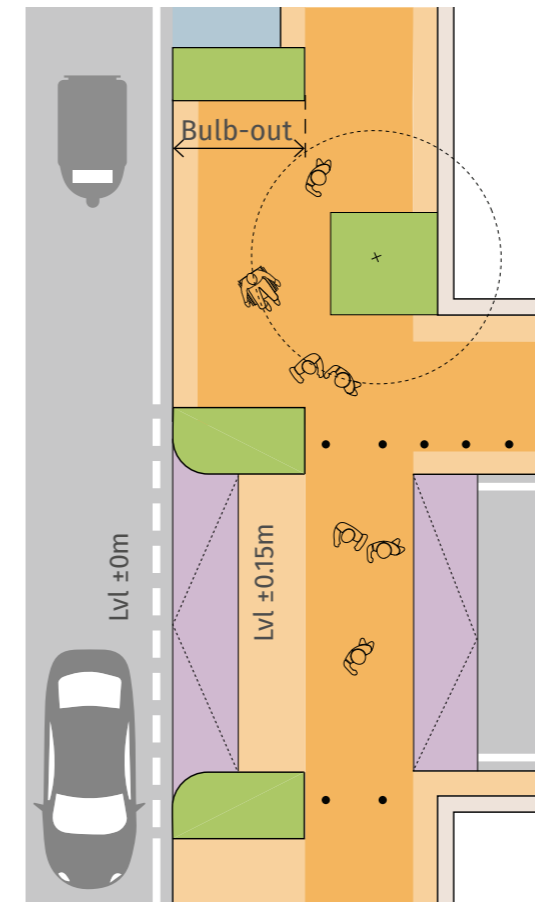


Typical 150mm THK kerb block



Typical kerb block with saucer drain

4.1.5 Continuity Across Streets & Fixed elements



Footpaths should continue across local streets as table-tops with ramps for vehicle access.

Bulb-outs in SEC

If there are permanent obstructions in the walking zone, a clear 2m wide walking zone should be maintained through bulb-outs in the SEC.

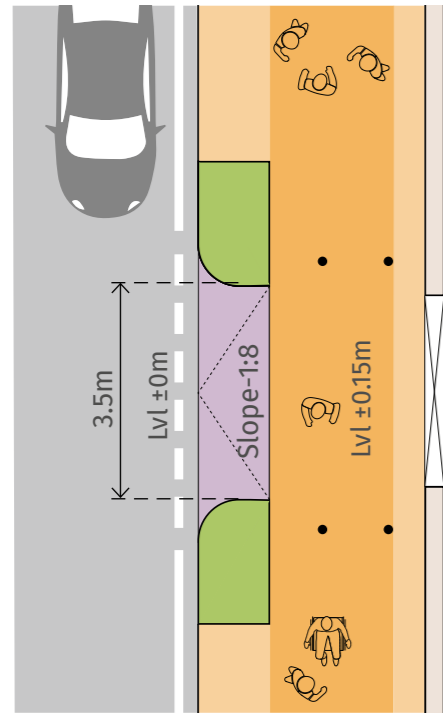


Footpath continuity maintained across local streets as table-tops in Ethiraj Salai, Chennai



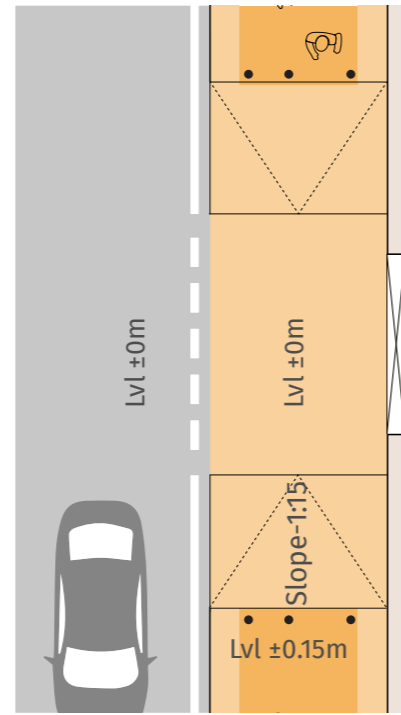
A clear wide footpath with vendors in SEC in Smart Janpath, Bhubaneswar
Image Source - Elements Creative India

4.1.6 Continuity Across Property Access



Streets with Footpath $\geq 1.5m$

Vehicle access ramp should have a slope of 1:8, and should not be wider than 3.5m to avoid parking encroachment.



Streets with Footpath $< 1.5m$ wide

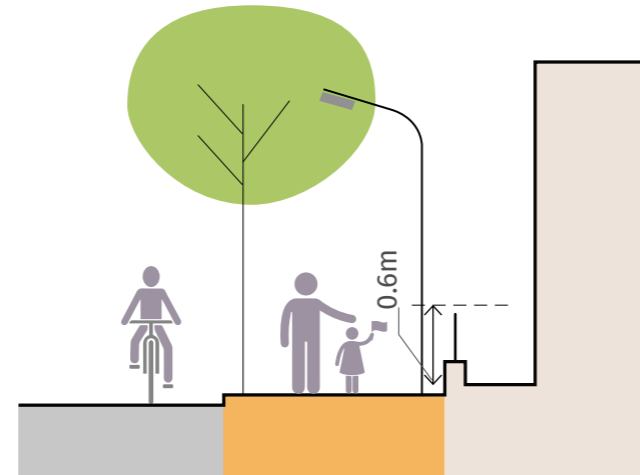
Footpaths should slope down at 1:15 to accommodate property entrances.

4.1.7 Eyes On Street

Street edges, featuring shop façades and vendors, or transparent boundary walls, contribute to a sense of safety. The “eyes on the street” aspect offers informal urban surveillance, as illustrated in the figure below.



Public building-use

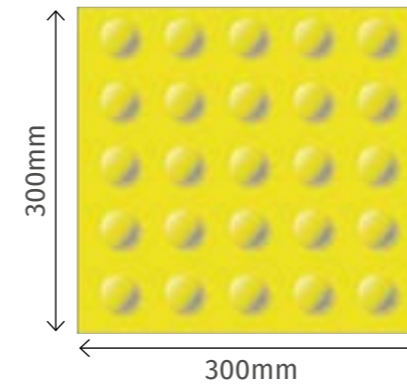


Private building-use

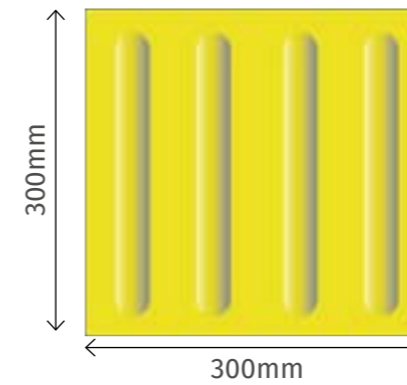
Compound walls should be discouraged for street edges having public building-use.

Instead, consider designing seating and interactive spaces that incorporate the compound wall. It fosters a more open and engaging environment, which enhances both the aesthetics and safety of the area.

4.1.8 Universally Accessible Streets



Blister Tactical - Dot-type blocks indicate a warning signal



Directional Tactical - Line-type blocks indicate the correct route to follow

Visually impaired pedestrians need guidance while walking to find their way, overcome obstacles, and cross safely. Tactile pavers should be laid 600mm away from the edge of any obstacle to avoid collision as shown in the figure.*

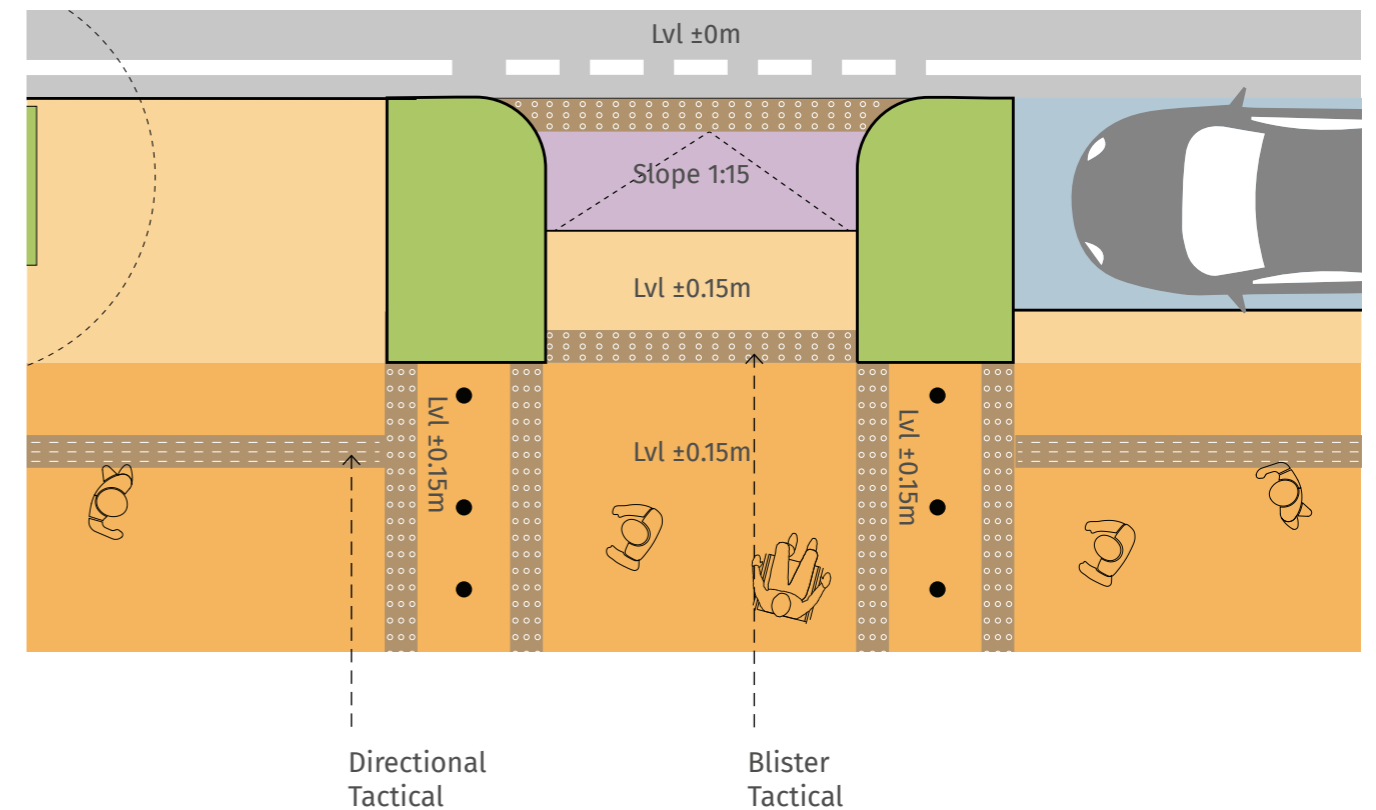
*Detail specification of tile design can be referred in IRC:SP:117

Surface material should be anti-skid such that any breaks in the surface (like drainage channels, expansion joints) are not more than 10mm wide.

Flared ramp



JM road, Pune. Image source - Oasis Designs Inc



Directional Tactical

Blister Tactical

4.1.9 Footpath on School Streets

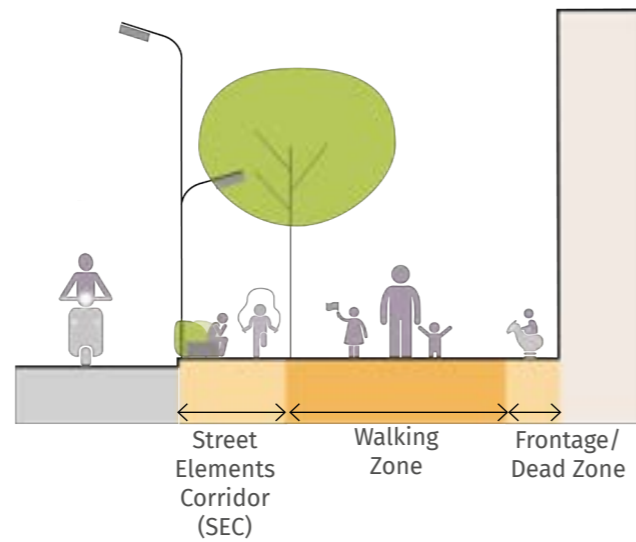
Since schools witness a large volume of children, the streets, especially the ones with the school entry / exit, shall be designed to accommodate the large volume of pedestrian traffic, as follows:

Frontage zone	minimum 1m
Walking zone	minimum 4m
Street Elements Corridor	minimum 2m

Footpath in the School Zone shall include a 0.5m wide landscape buffer in the SEC zone, along the kerb edge.

Footpath in the streets without the school entry / exit, and within the School Zone, shall be designed based on the street character and RoW.

Some of these streets, including the ones with the school entry/exit, can be designed as pedestrian-only streets that allows only walking, cycling and public transport. Refer Chapter 2.1 for more details.



4.2 Cycle Tracks

The cycle is a core mode of urban transport. Cycles offer low-cost, pollution-free mobility and occupy only a fifth as much driving and parking space as automobiles. Due to the lack of physical separation of motorised and non-motorised vehicles, cyclists face inconvenience and safety hazards from faster moving traffic. Therefore, the provision of safe and convenient cycling infrastructure is essential to attract new users.

Cycle tracks should be continuous, with smooth curves to ensure uninterrupted movement. They should be well-shaded and well-lit to enhance comfort and safety. Rather than being isolated segments, cycle tracks should be planned as a cohesive network for seamless connectivity across neighbourhoods. To create safe and efficient cycling infrastructure, the following key design principles must be followed to improve usability, prevent encroachment, and integrate seamlessly with urban streets.

- **Safety** – Physically separated infrastructure that ensures safe and conflict-free cycling.
- **Continuity** – A well-connected network that allows uninterrupted movement.
- **Directness** – Routes that provide efficient and convenient connectivity.
- **Comfort** – Design elements that enhance the cycling experience, including smooth surfaces, adequate width, and shade.
- **Accessibility** – Infrastructure that enables inclusive cycling for all, including people with disabilities.
- **Security** – Well-lit and naturally surveillance cycle tracks that enhance personal safety.
- **Visibility** – Clear signage, lighting, and markings that improve awareness and way finding.
- **Integration** – Seamless connections with public transport, pedestrian zones, and key destinations.



4.2.1 Cycle Tracks and Cycle Lanes

Physically segregated cycle tracks

Physically segregated cycle tracks ensure safety and reduce the possibility of encroachment by moving motor vehicles and parking. These are recommended for streets with predominantly speeds exceeding 30 km/h to enhance cyclist safety—typically streets with RoW $\geq 18\text{m}$.

At footpath level

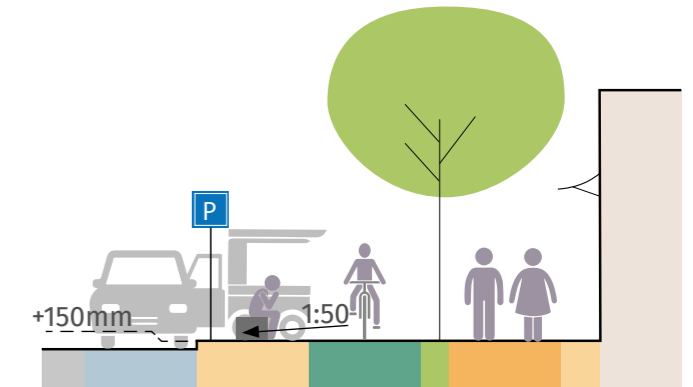
Cycle tracks at footpath level are recommended to prevent encroachment by moving vehicles and parking.

Painted cycle lanes

These can be provided while testing new designs on existing streets. However, painted cycle lanes that are not physically segregated or are at the same level as the carriageway are prone to encroachment by moving vehicles, vending, and parking. Therefore, parking and vending areas shall be clearly demarcated to prevent such encroachments.

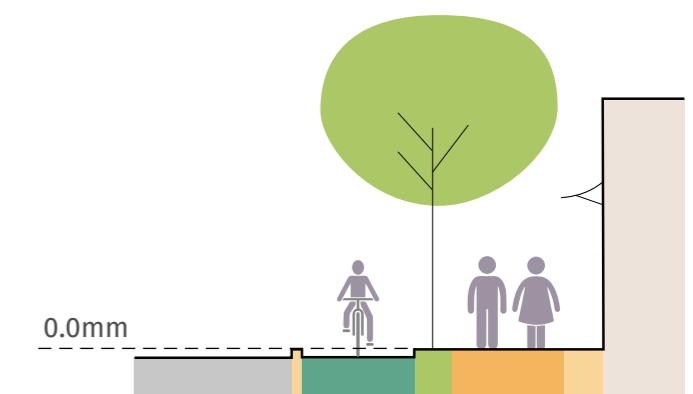


Painted Cycle Track in Chandigarh, Image Source - Smart Commute Foundation



Buffer

In streets with parking along cycle track, a buffer of minimum 0.5m should be provided to protect the cyclists from dooring—a situation where a parked vehicle's door opens suddenly into the cyclist's path, causing a collision. In other cases, only a kerb (0.15m wide) may be used as a buffer to save space.



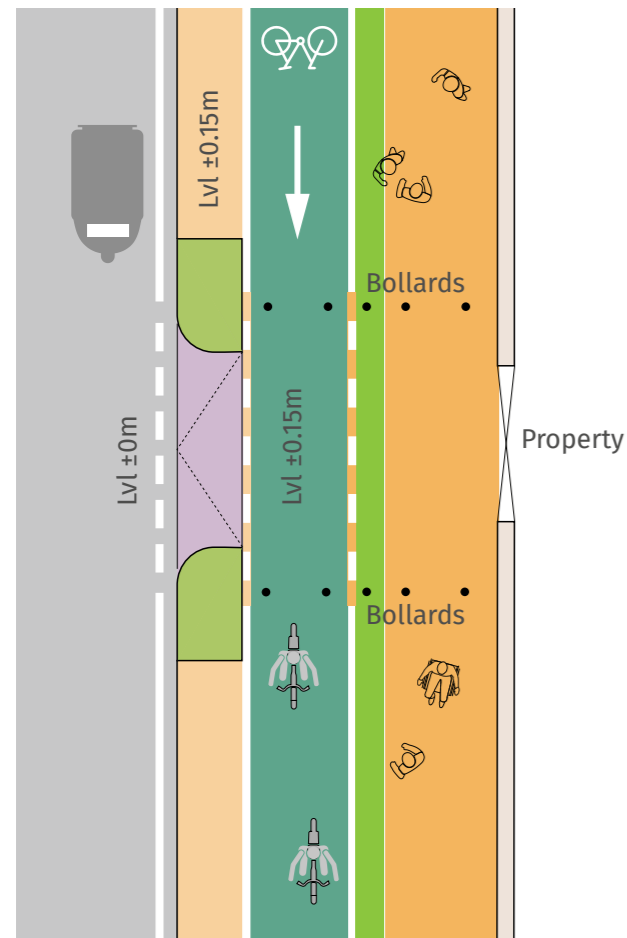
At carriageway level

Cycle tracks at road level have lower construction and maintenance costs, but they may not be universally accessible to wheelchair users when crossing from the sidewalk to the road due to the level difference.

Points to note

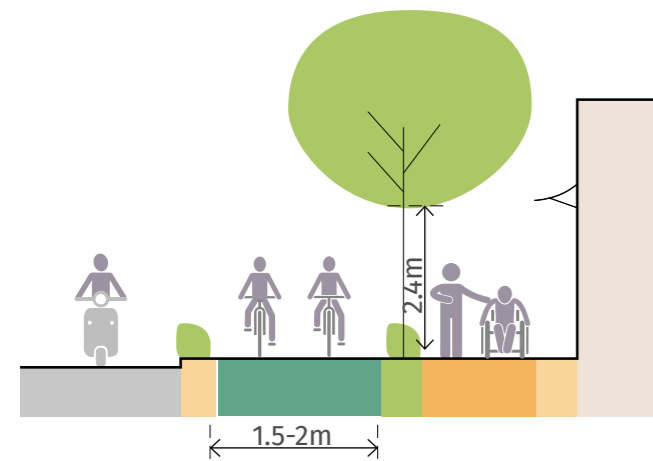
Cycle tracks should be clearly demarcated using paint & signage, especially at intersections and property entrances to deter motor vehicle encroachment. To prevent pedestrians from using cycle tracks, ensure there is a clear and unobstructed walking space.

4.2.2 Continuity across Property Entrances



At property entrances and intersections, the cycle track should continue at the same level and vehicle access should be provided by a ramp in the buffer, where possible.

Frequent change in the direction and location of cycle tracks should be avoided, unless absolutely necessary to accommodate public facilities, like vendors, bus stops.



Width

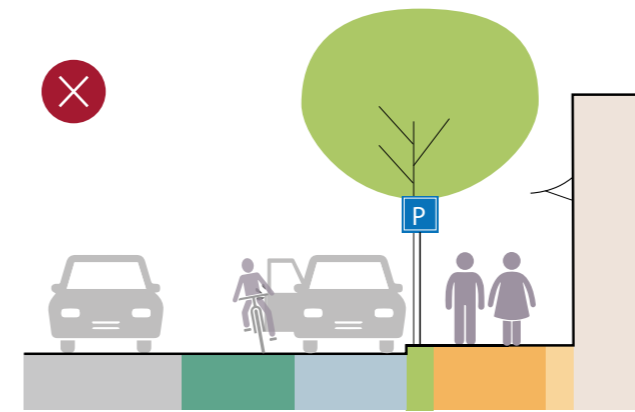
Cycle tracks should be minimum 2m wide for one-way movement and minimum 3m wide for two-way movement as per IRC. In Chennai's context, it is optimised to 1.5m for unidirectional single track.

Vertical Clearance

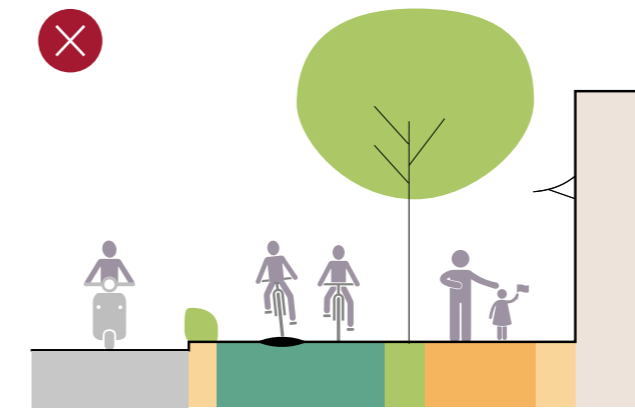
Vertical clearance of 2.4m should be maintained at all points.



4.2.3 Comfort & Safety



Cycle tracks should not be provided between parking and carriageway to ensure cyclists don't get hit by dooring.



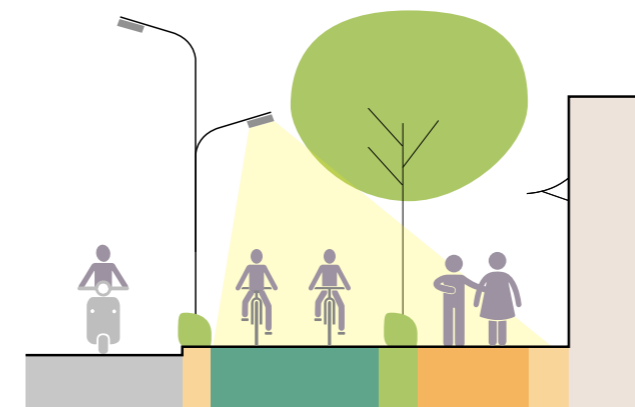
Surface

Cycle tracks should have an even surface free from undulations due to material or any level difference.



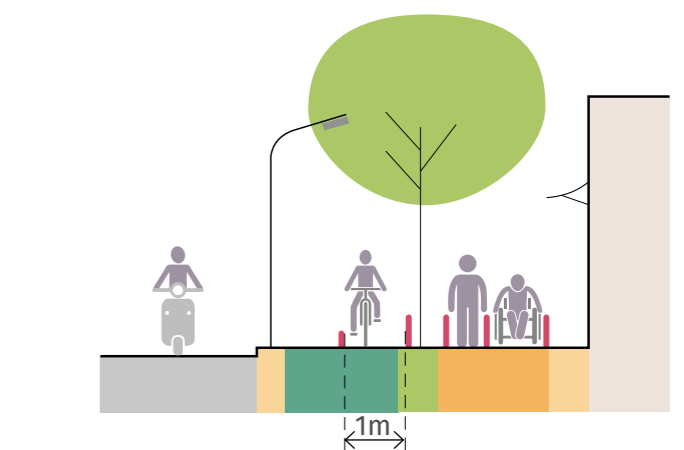
Shade

Continuous shade through tree cover should be provided to shelter cyclists from harsh weather.



Visibility

Cycle tracks should be well-lit and be clearly differentiated from footpath and carriageway. It is recommended to demarcate the cycle track through a coloured surface and lane markings.



Bollards

Bollards of height 0.2-0.4m with a clear spacing of 1.2m clear distance along the width of the cycle track can be provided to prevent 3 and 4 wheelers encroachment. 2-wheeler encroachment shall be avoided through enforcement.

Please note that closely spaced bollards can obstruct the movement of cyclists, force them to reduce the speed, thereby discouraging cyclists to use cycle tracks.

4.2.4 Markings and Surface Treatment

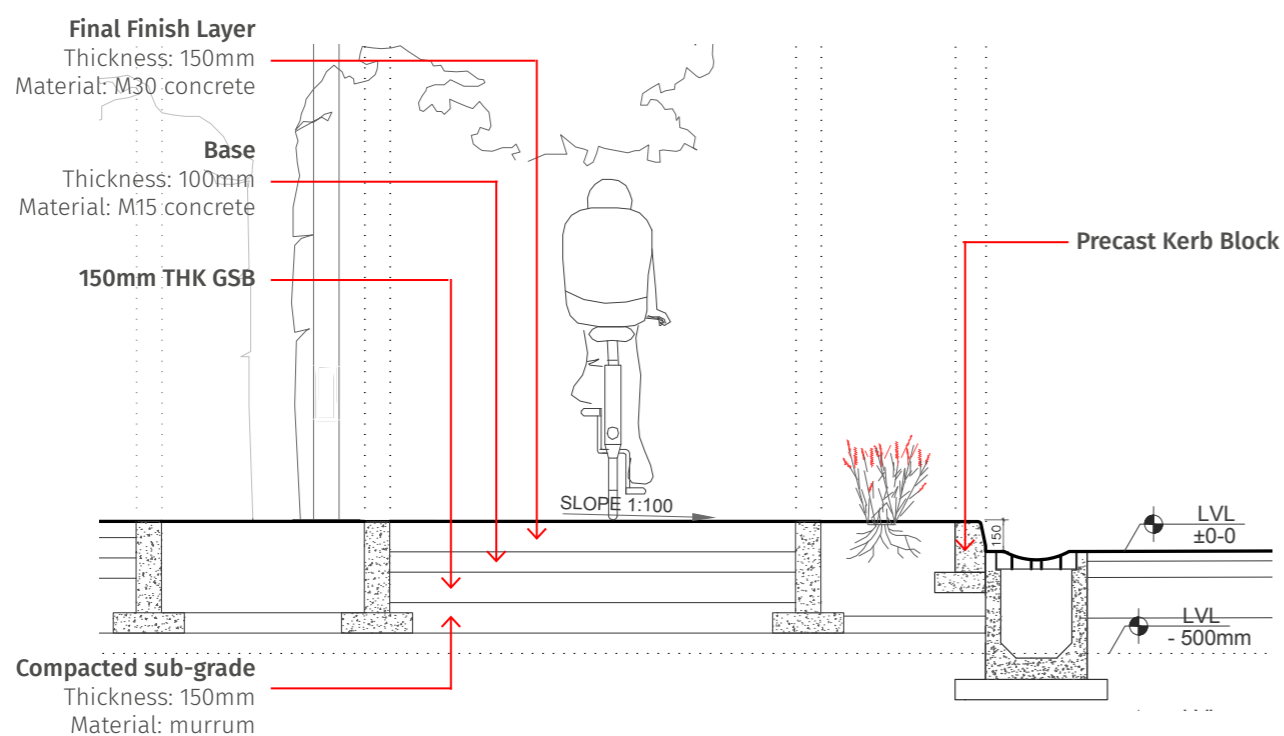
Markings and surface treatments enhance safety, visibility, and usability, serving a different purpose than the cycle track's base material. While materials like asphalt or concrete form the structural foundation, markings provide clear guidance, highlight hazards, and improve navigation, ensuring a safer and more intuitive cycling experience for users.

Refer Chapter 7 on materials for more information.



Paint Types	Easy to Apply	Low Cost	Long Lasting	Highly Visible	Easily Available	Application	Remarks
Thermoplastic Paint	✗	✗	✓	✓	✓	Lane marking, cycle logo	Available in limited colours ; Takes time and machinery to apply
Acrylic Distemper Paint	✓	✓	✗	✓	✓	Surface treatment	Does not need primer; Takes longer to dry
Floor Coat Emulsion Paint	✓	✗	✓	✗	✗	Surface treatment	
Water-based Epoxy Paint	✓	✓	✗	✗	✓	Surface treatment	Takes lesser time to dry
Aerosol Spray Paint	✓	✗	✓	✓	✓	Surface treatment, Cycle logo	Available in many colours

Table showing materials that can be used for surface treatment of cycle track



Cross section of cycle track

4.2.5 Cycle Tracks in School Streets

Children during the age of 6 – 17 years tend to expand their independent mobility to school especially through cycling with a parent or by themselves. To support and encourage this choice, it is imperative to provide dedicated cycle tracks and ensure adequate cycling infrastructure within School Zones. To achieve a safe and accessible cycling environment for children, well-connected and continuous cycling networks should be planned and implemented, as opposed to the current disconnected and unusable segments of cycle tracks.

To accommodate a child cycling with a parent, segregated cycle tracks 2-3m wide (one-way) shall be provided within the School Zone.

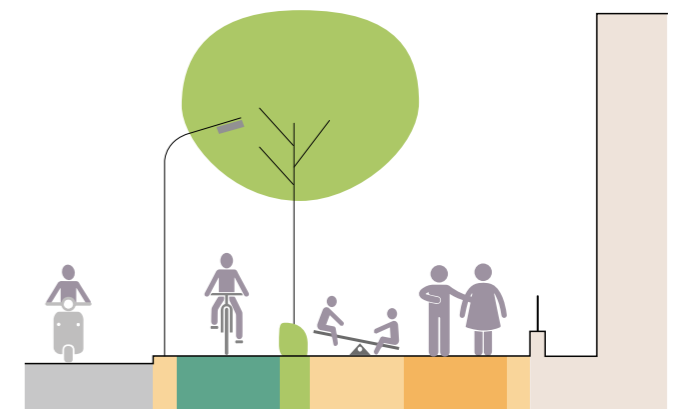
The placement of the cycle track must be at the kerb edge or between the Walking Zone and SEC zone of the footpath based on the local context. The placement should factor in the safety of children.

In streets where provision of cycle tracks is not feasible, painted cycle lanes shall be provided. Painted cycle lanes must be combined with supportive traffic calming measures to ensure lower speeds of motor vehicles.

Dedicated cycle signals shall be provided to ensure safety and improve confidence for children cycling, especially at intersections which witnesses high traffic volumes.



Cycle track between the SEC and Walking Zone



Cycle track along the kerb edge



Pashan-Sus Road, Pune

4.3 Pedestrian and Cyclist Crossings

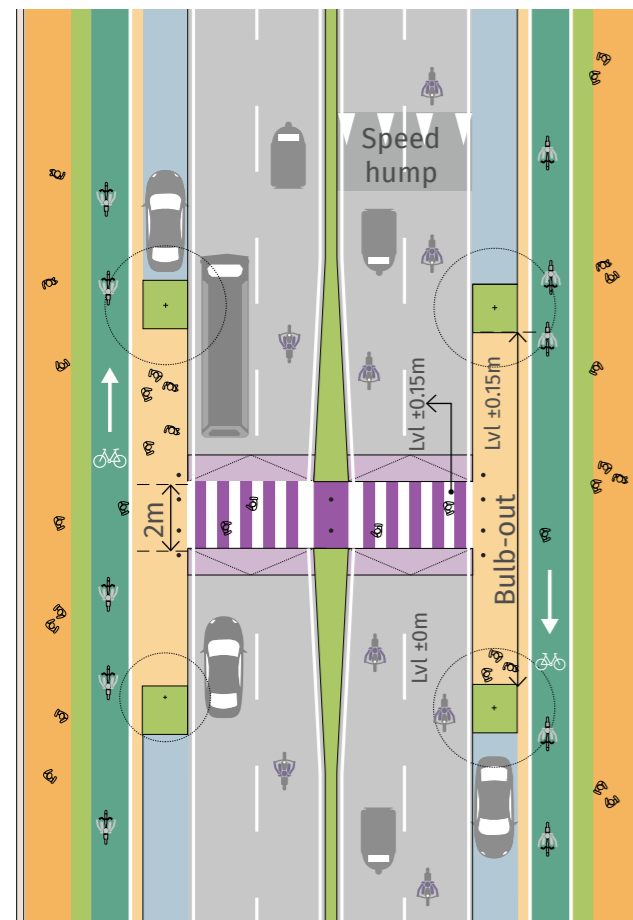
Well-designed mid-block and intersection crossings provide a safe and convenient way for pedestrians and cyclists to cross streets, discouraging them from risking their lives on urban streets.

Foot-over bridges or subways are often inconvenient and hotspots for crime and anti-social activities. Hence, pedestrian foot-over bridges should be considered only on urban expressways where vehicle speeds are above 60kmph.



DP & ITI Road, Pune
Image Source -Elements Creative India

4.3.1 Table-top Crossing



Location

Tabletop crossings are recommended to be provided at all unsignalised locations. They are also ideal for footpaths of narrow widths where providing ramps is not feasible.

Height

Raised to the level of the adjacent footpath (maximum of 0.15m) with the vehicular ramps of 1:8 slope provides wheelchair access too.

Intervals

Every 80-150m in commercial / mixed-use areas
Every 80-250m in residential areas

Width

At-least 2m wide and 4m in front of schools, hospitals, markets and other high footfall areas as per IRC:103

Bulb-outs

In case of a parking lane, bulb-outs should be provided to reduce the crossing distance.

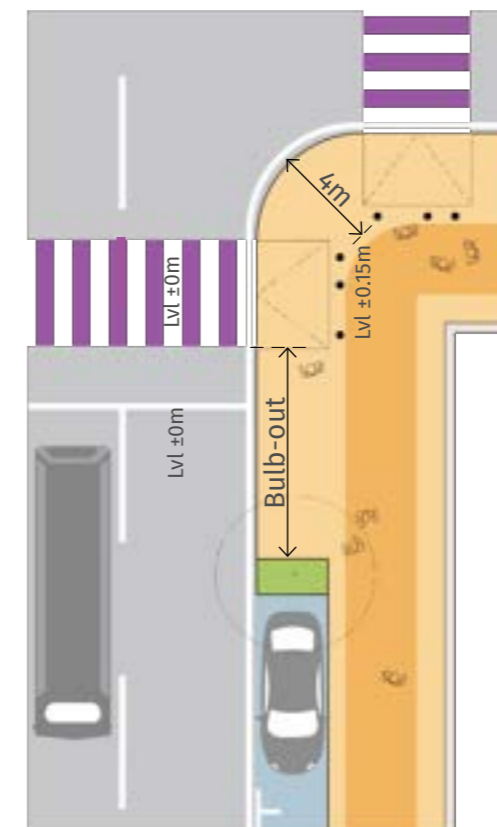
Traffic-calming

It is recommended to provide speed hump at a distance (as per IRC:99) before the table-top crossing to slow down vehicle speed before table top.



Cobble stone paving on road before table top to slow down vehicle speed

4.3.2 Zebra Crossing with Ramps



Location

Zebra crossings are recommended at signalised crossings.

Height

Footpath should be ramped down (slope 1:15) to the level of the carriageway.

Width

At-least 2m of width should be provided.

Turning

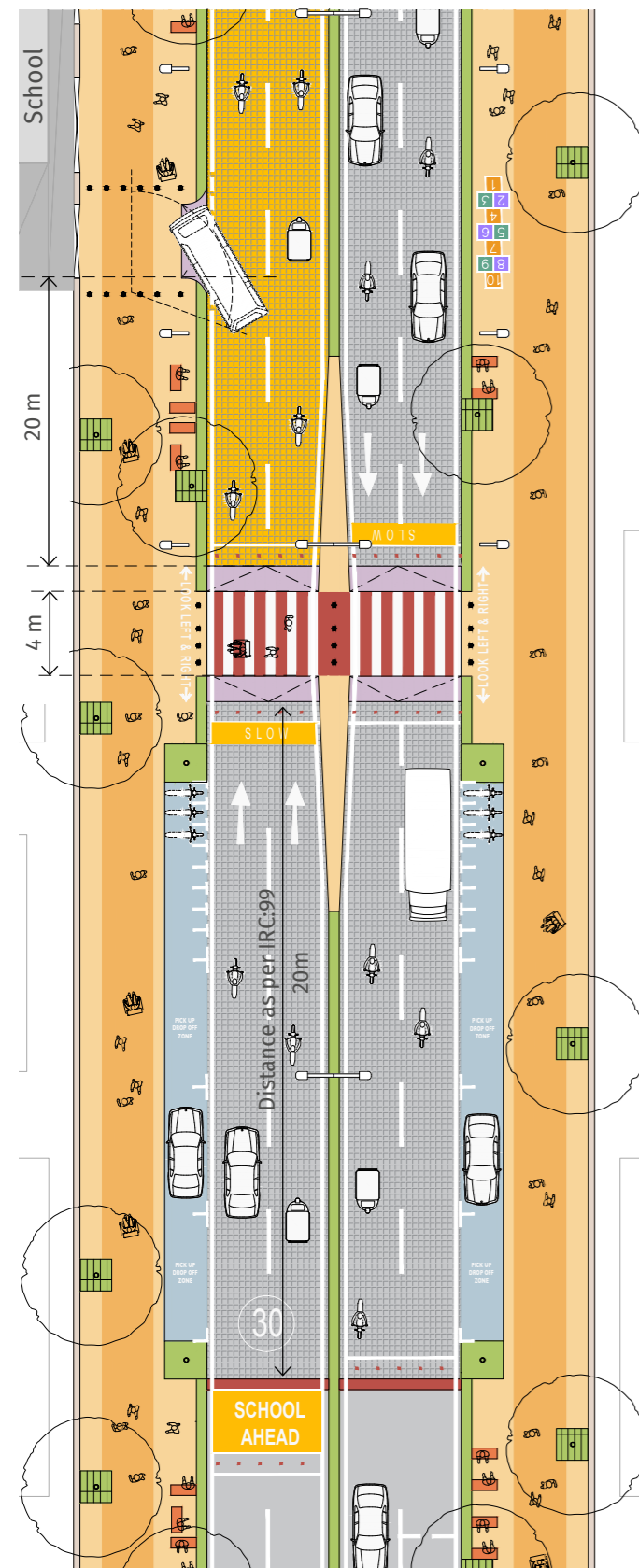
Small turning radius slows down vehicles and increases pedestrian safety while crossing.

Turning radii at intersections should be 4m on local and collector streets, and maximum 9m on arterial streets.

4.3.3 Pedestrian Crossing near Schools

Children have limited cognitive ability to navigate multi-directional traffic and they tend to cover shorter distances than adults. It is therefore important to ensure that crossings around School Zones facilitate reduced crossing distances while helping the children focus on one direction of traffic.

Table-top Crossings



Raised crossings increase visibility and the potential for a vehicle to yield to a crossing child. Hence, a tabletop crossing shall be provided in school zones as opposed to unsignalised zebra crossings.

Location

Table-top crossings shall be provided at a distance of 30m on either side of the school entry/exit, combined with the “SLOW” road marking.

Width

A tabletop crossing shall at least be 2m wide in front of schools.

Height

The tabletop shall be 150mm high and must match the height of the footpath to ensure seamless movement of pedestrians.

Traffic-calming

Speed humps shall be provided at a distance from speed table (as per IRC:99) for smooth reduction in motor vehicle speeds. The road marking “SCHOOL AHEAD” shall be combined with the speed humps.

Intervals

Table-top crossings shall be provided at 80-150 m intervals, along the street with the school gate.

4.3.4 Pedestrian Grade Separators

Prioritise At-Grade Crossings

As per IRC:103–2012, at-grade pedestrian crossings are the preferred option. FOBs and subways should be considered only where at-grade solutions are not feasible due to very high traffic volumes or safety constraints.

Location

Entry structures should be placed within the Street Elements Corridor (SEC) without obstructing the clear walkway. Maintain minimum clear widths as per IRC:103 for footpaths around entries.

Alignment

Place FOBs and subway entries on desire lines, directly aligned with pedestrian flow. Entries must connect seamlessly to continuous footpaths, without forcing detours or unsafe crossings.

Ensure good sightlines; avoid creating blind spots or unsafe corners.

Universal Accessibility

Provide ramps, escalators or elevators at all FOBs and subway access points, as recommended in IRC:103. Ensure tactile paving, handrails, non-slip surfaces, and adequate lighting throughout.

Integration With Public Transport

FOB/subway landings should be located within 20–50 m of Metro/rail/bus station entries. FOB/Subway can be provided at Multi Modal Integration hubs

Safety & Surveillance

Integrate CCTV coverage, adequate lighting, and emergency call points in and around entry points.

Parking & Traffic Management

No parking or loading zones should be permitted within 20–30 m of FOB/subway entries.

Maintenance & Operations

Ensure easy access for cleaning, maintenance, and drainage management. Road Owning Agencies will have to maintain the infrastructure.

Materials must be durable, low-maintenance, and weather-resistant as recommended in IRC:SP:90.



Alandur Metro Station
Image Source CMRL



Post Office Subway, Anna Salai, Chennai

4.3.5 Across Intersections

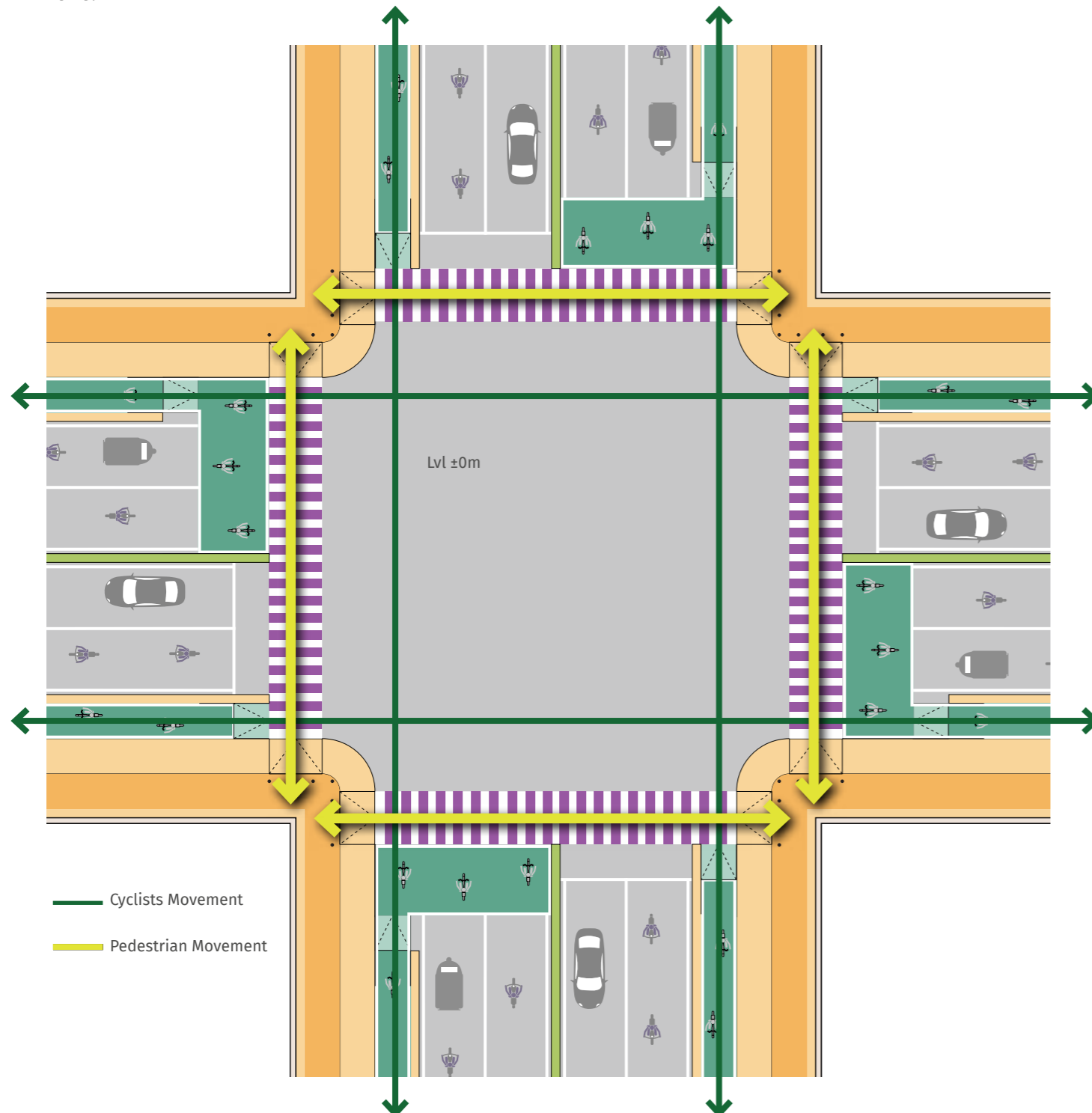
Streets with segregated cycle tracks

Continuity of cycle tracks should be maintained at intersections. Bike box should be added to allow cyclists to wait at the signals.

Streets without segregated cycle tracks

In case of narrow streets where segregated cycle tracks are not provided, the intersection can be raised to reduce the traffic speeds and enhance safety for cyclists.

Pedestrian crossings should be located at all corners of the intersection, such that there is minimum deviation from the path of the walking zone.



— Cyclists Movement
— Pedestrian Movement

4.3.6 Intersections near School Zone

Within the school zones, table-top crossings with pedestrian access ramps shall be provided across all unsignalised arms of the intersection. This increases visibility and the potential for a vehicle to yield to a crossing child.

Signalised street junctions shall be designed with zebra-crossings.

Appropriate signage and road markings shall be provided around the intersections.

Intersections shall be designed in accordance with the guidelines specified in Chapter 4 of this document.

Yellow Carpet Zones at Intersections

To alert vehicle drivers to slow down and to make children more visible to the drivers, the street corners around intersections can be painted in yellow.

Signalised intersection in a School Zone

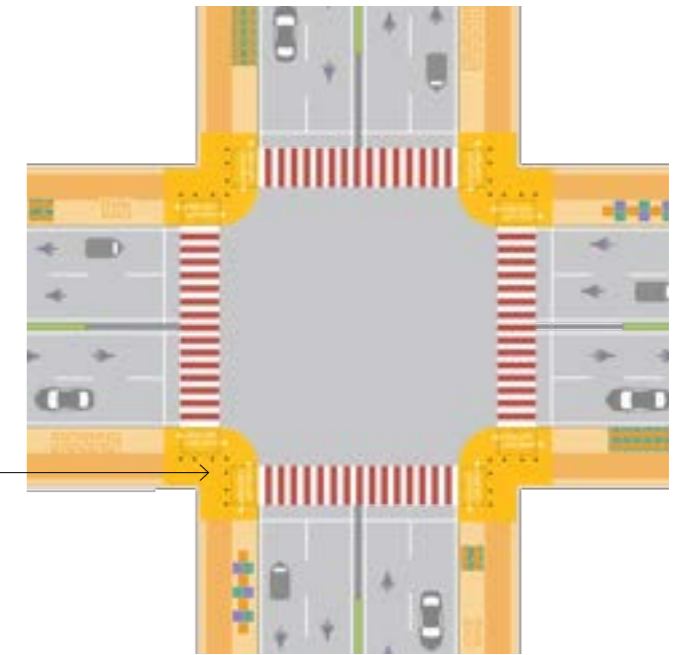
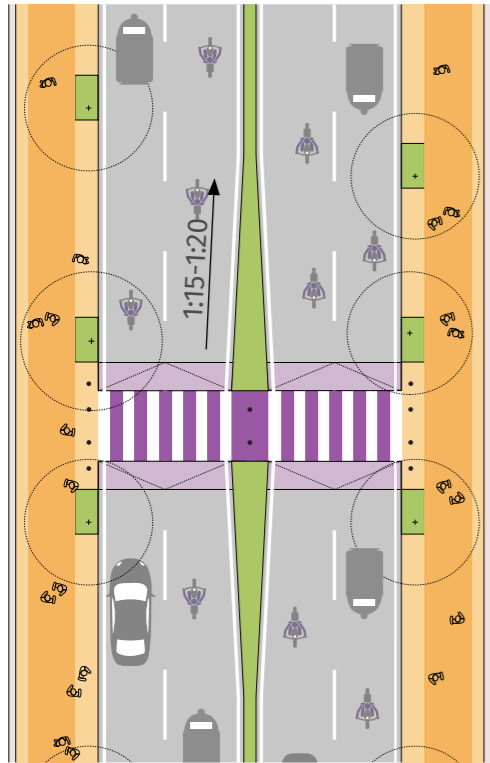


Image Source: 3M

4.3.7 Median & Pedestrian Refuge

Medians reduce conflict between opposite directions of traffic and channelises the traffic in high traffic volume streets. Pedestrian refuges or refuge islands provide easy crossing and safety to pedestrians at large intersections. It provides intermediate resting point for pedestrians while crossing a large intersection. It breaks the crossing length in small segments. The unused carriageway space at intersections should be converted to pedestrian refuge for safe crossing and efficient vehicle throughput. Refuge islands should be free of landscaping and fencing to ensure usability.



Criteria for median

Streets with more than two lanes in each direction should have a median.

Break in the median

Break in the median should be provided every 80-150m for pedestrian crossings along commercial / mixed-use streets and 80-250 along residential streets; frequency can be adjusted based on site conditions.

Median width

Medians should be of uniform width, 1.2m wide. Where pedestrian refuge needs to be added, a gradual variation in median width of 1:15-1:20 should be provided as shown in the diagram.

Landscape

Bushes should be trimmed to ensure visibility. Drought-tolerant, low maintenance native species that are capable of storm water filtration should be planted on the medians.

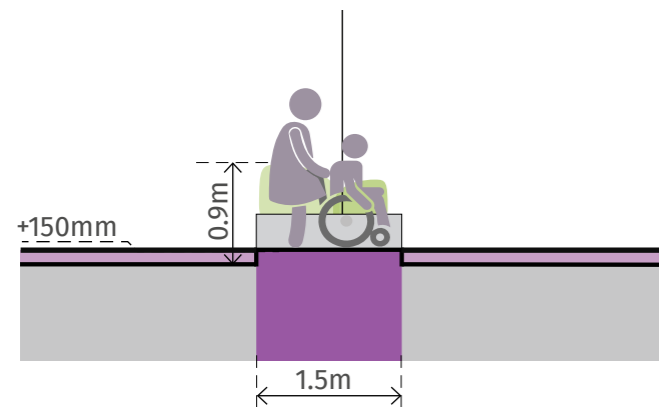
Pedestrian refuge width

For a safe and inclusive pedestrian refuge, for people with strollers, wheelchair, cycles; a minimum 1.5m width of refuge should be provided. The refuge island shall be at the level of carriageway to ensure access to wheelchair and free from any landscaping.

Bollards

Bollards should be placed in the refuge to prevent motor vehicles from turning.

Refer Chapter 4 for more information.



Smart Janpath, Bhubaneswar.
Image Source - Elements Creative India

4.3.8 Median & Median Refuge near School Zones



Harrington Road, Chennai

To help children focus on one-directional traffic and to reduce their exposure time to traffic while crossing, streets can be designed with continuous median with refuge based on the number of lanes and street width.

For people with strollers, wheelchairs, cycles; a minimum 1.5m x 2.4m pedestrian refuge shall be provided.

Bollards shall be placed in the refuge to prevent motor vehicles from turning while ensuring it does not obstruct the movement of persons on wheelchair and cyclists.

For streets with more than 2 lanes, refer section 2.3.1 of the guidelines.



The table-top crossing is not at the same level as the footpath, 3rd Avenue, Besant Nagar, Chennai



Table-top crossing is at the same level as the refuge island and the footpath, DP Road, Pune

4.3.9 Mid-Block U Turns

To improve traffic flow and reduce congestion, Thoothukudi shall introduce U-turns across key corridors. These solutions are to be explored at mid-blocks to ease the movement of vehicle u-turns.

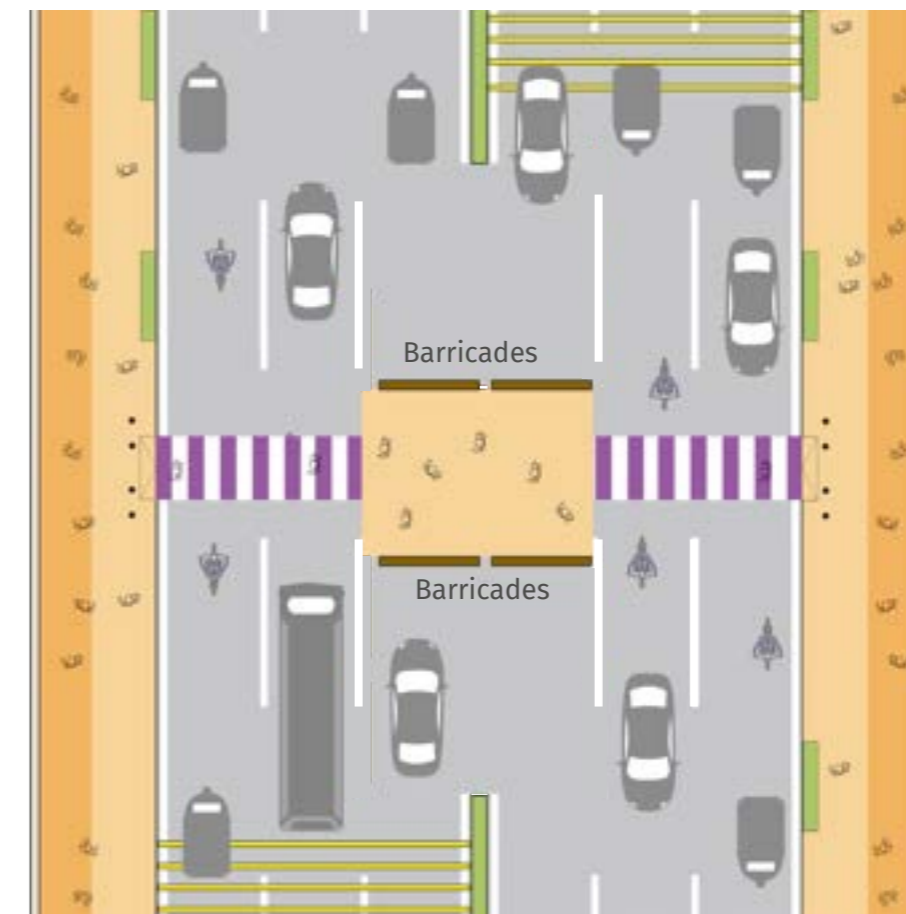
This signal-free u-turn initiative will ease vehicle congestion and reduce travel time. However, pedestrian safety at mid-block crossings still poses a challenge.



U-turn in CIT Nagar, Chennai.
Image Source: Greater Chennai Traffic Police

Signal-free stretches can work if drivers are courteous enough to allow pedestrians to cross. In the absence of it, additional design features shall be integrated, to ensure the safety and comfort of pedestrians, while maintaining efficient vehicular flow.

The below mentioned example provides temporary solutions for the temporary u-turn interventions currently being implemented. It is recommended that the city implements permanent design solutions, as outlined in this document, to ensure all street users feel safe and comfortable while using the street



Conceptual Representation: Even temporary measures shall include temporary pedestrian crossings and refuge islands

Space for pedestrians—zebra crossing, pedestrian refuge islands—shall be provided at the mid-block.

Pedestrian signals shall be provided at the crossing to ensure pedestrians have sufficient time to cross. For signal timings and phasing, refer to Chapter 4.2.5.

Traffic-calming elements such as rumble strips and speed humps shall be provided before the mid-block u-turns to reduce vehicle speed as they approach the mid-block.

Signage and road markings shall emphasize pedestrian priority at designated crossings to promote compliance.

4.4 Traffic-calming measures

Traffic-calming features decrease vehicle speeds, reducing the likelihood of fatalities and severe injuries from accidents. They also create safer conditions for pedestrians and cyclists sharing the road with motor vehicles, especially when separate footpaths and cycle tracks are unavailable.

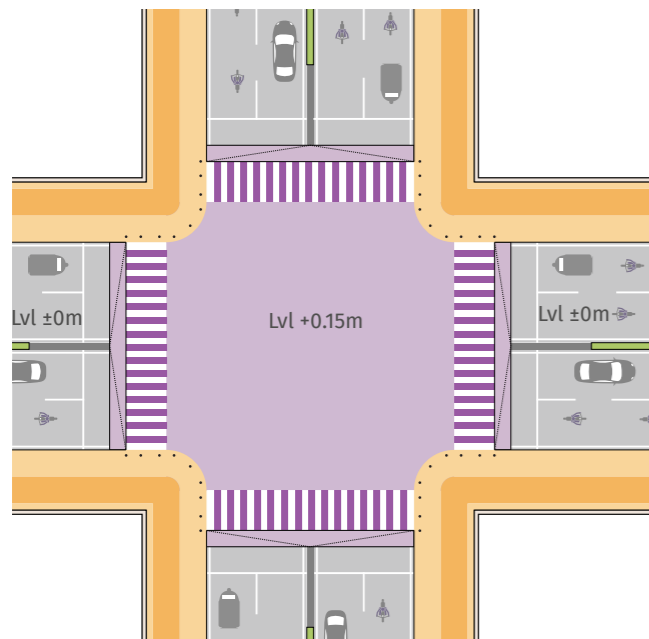
Traffic Calming measures are recommended where pedestrian-vehicle conflicts are expected to occur.



Image Source: Copenhagenize

4.4.1 Vertical Displacement

Vertical Displacement includes Raised junctions, Speed humps, Speed bumps, Speed tables, Speed cushions

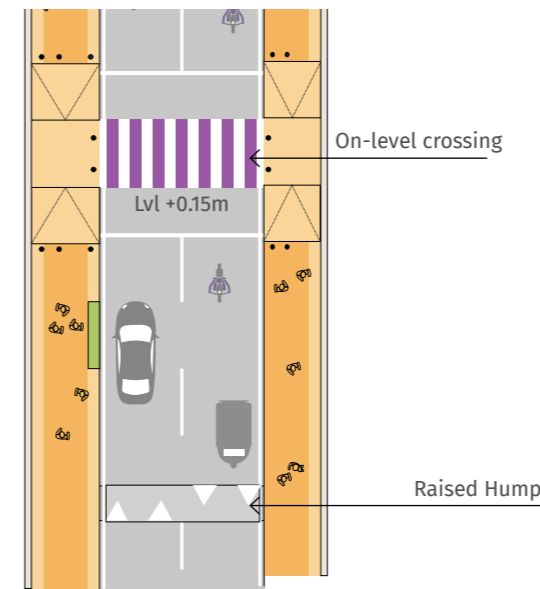


Raised Junctions

Elevated platform encourages motorists to slow down, promoting safer road interactions and minimizing the risk of accidents.

The raised nature of these junctions provides a visual cue to drivers, reinforcing the need for caution in specific areas.

Material difference on the carriageway (like cobble-stone paving) can be provided up-to a distance of 10-20 m from the speed tables to slow down traffic and ensure pedestrian safety.



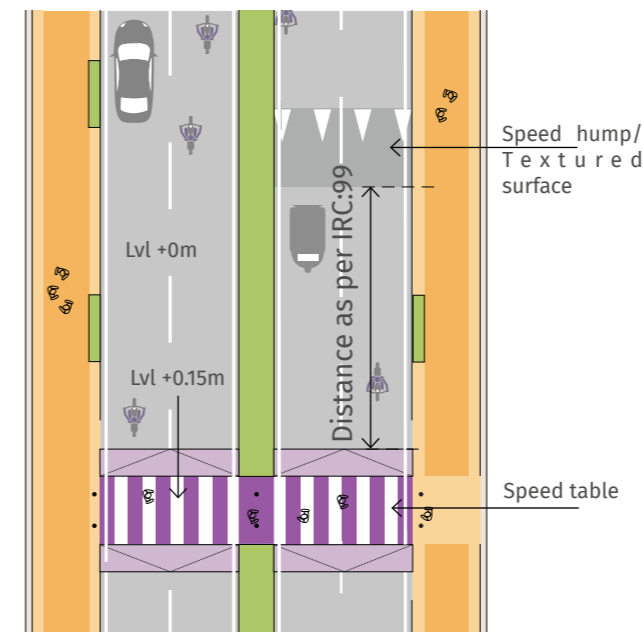
Speed Humps

Speed humps are cast-in-situ in the carriageway and provide a smooth reduction in motor vehicle speeds.

Location criteria

Speed humps can be provided on local and collector streets. Steep speed humps may lead to discomfort for drivers.

These should be located at a distance (as per IRC:99) from pedestrian crossing.



Speed Tables

Speed table (also known as table-top crossing) is a crossing raised at the level of footpath, that extends to the full width of the carriageway.

Speed hump should be provided at a distance from speed table (as per IRC:99) for smooth reduction in motor vehicle speeds.

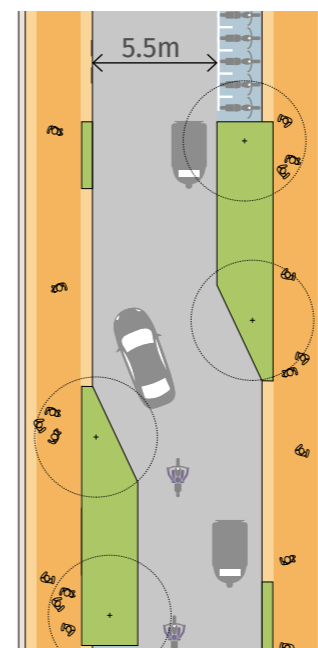
Location criteria

Speed table should be provided on arterial and collector streets at:

- Unsignalised junctions
- Mid-block crossings with frequent pedestrian movement

Refer IRC:99 for design standards of speed table on bus routes.

4.4.2 Horizontal Displacement



Chicane

Chicanes combined with temporary/permanent barriers in the carriageway may be provided on local streets to slow down the vehicles. It should be combined with retro-reflective hazard markers.



4.4.3 Traffic Calming Measures in School Zone

Children struggle to navigate road traffic effectively, making them susceptible to various traffic risks, especially speeding vehicles. The risk of severe injury and fatality increases exponentially with speed and the impact will be even worse for a child.

Hence a safer speed limit (15 to 30 kmph) is recommended in School Zones where Vulnerable Road Users (VRUs)—young and elderly pedestrians and cyclists—share the carriageway space with vehicles. This also helps alleviate the inherent fears of traffic among parents and caregivers, and can potentially lead to an increase in independent mobility of children through active transportation.



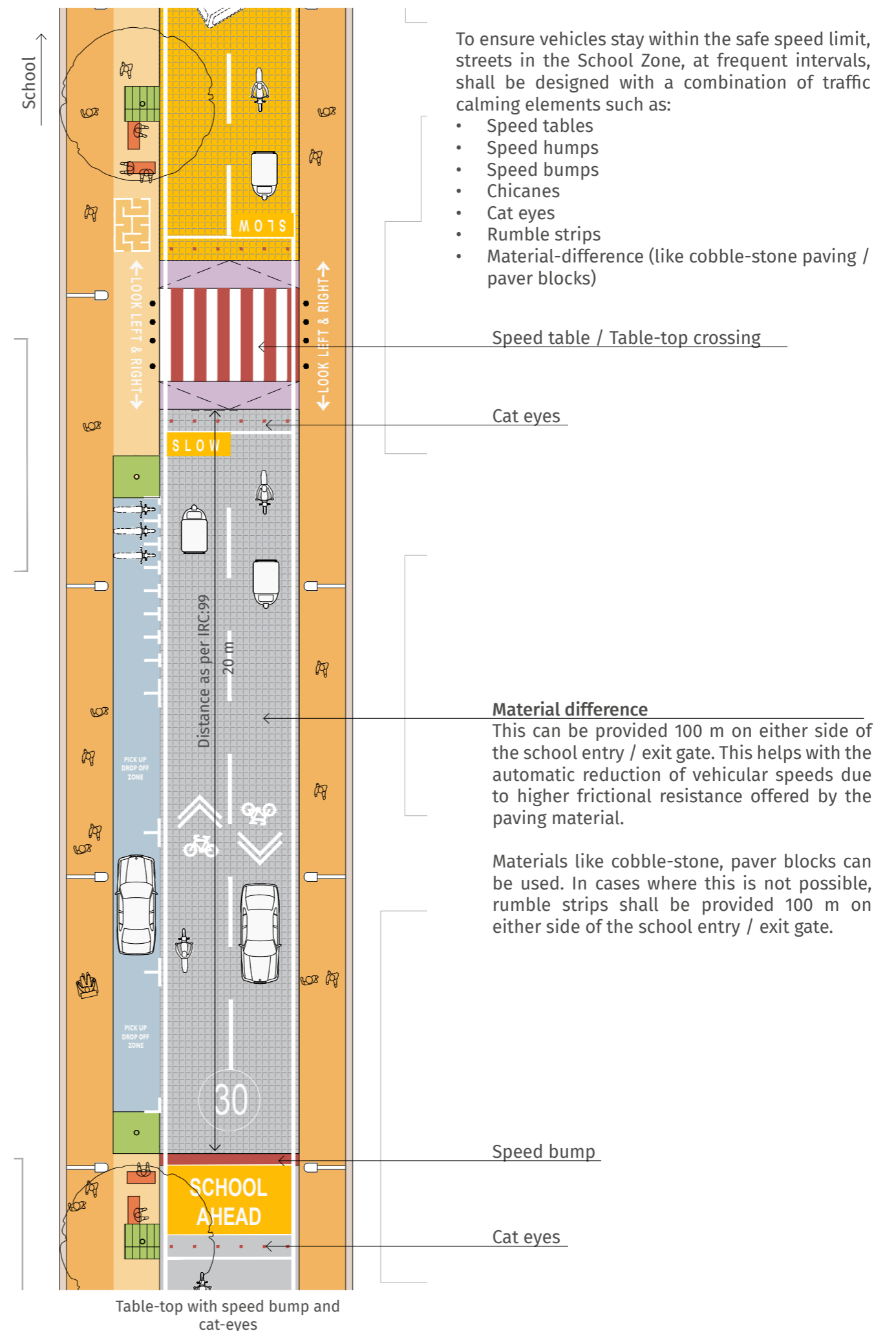
Location & Design



All streets within the School Zone (500m around the school) shall be designed to ensure vehicles drive within the safe speed limits—15kmph to 30kmph—as mentioned in IRC SP: 32.

Traffic calming elements and sufficient speed signage can be incorporated to achieve this.

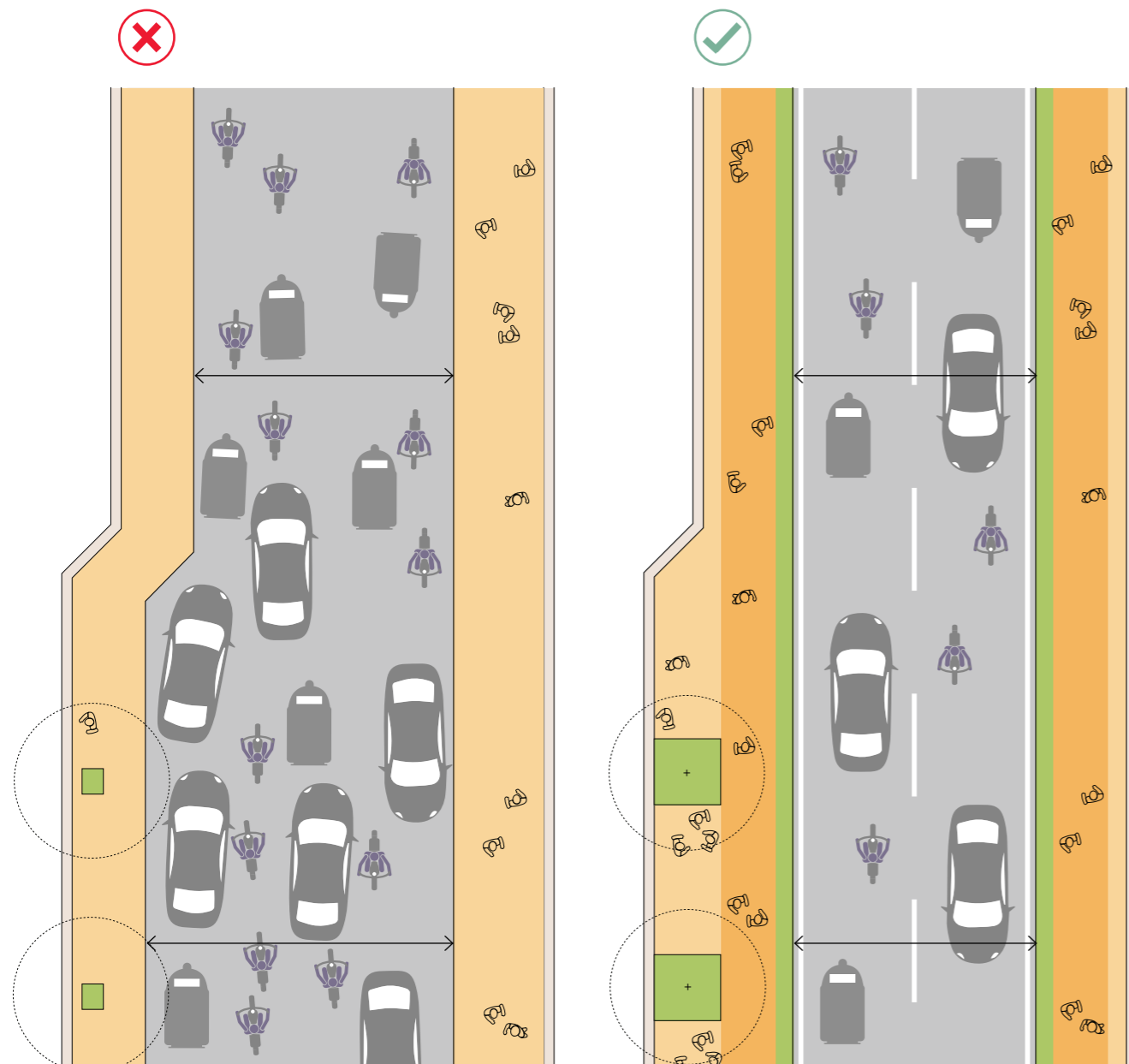
Refer Chapter 2.6 for more information on traffic calming measures.



4.5 Carriageway

The purpose of a carriageway is to enable seamless movement of vehicular traffic. A consistent width must be maintained throughout the street length to avoid bottlenecks. A carriageway can be designed for appropriate speeds based on the function of streets in the city network.*

4.5.1 Design



The carriageway width should not increase in portions where a wider RoW is temporarily available. Bottlenecks lead to congestion and traffic jams.

*Refer Table 1: Street elements and their presence on Arterial, Sub-Arterial, Collector and Local Streets

4.5.2 Carriageway Width

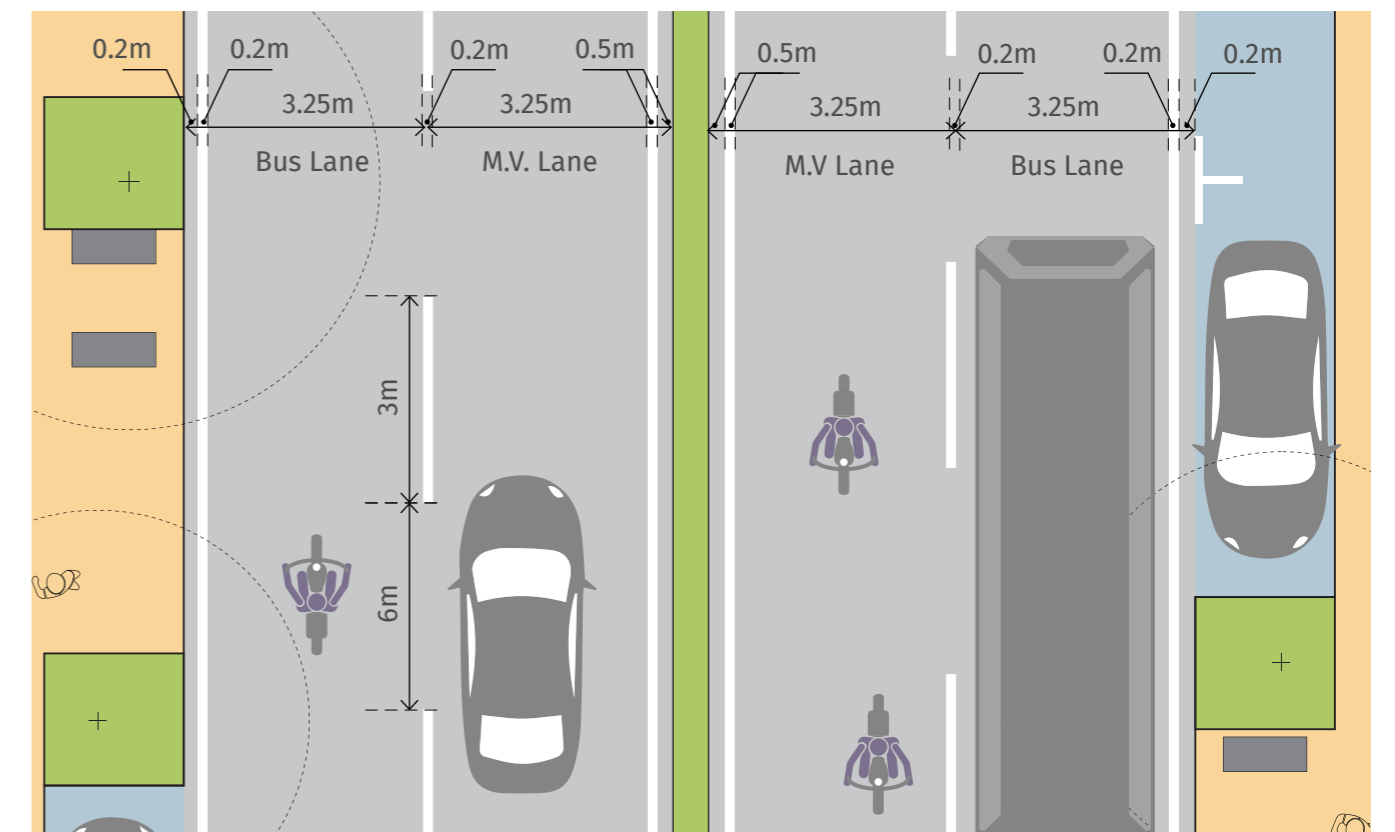
The table below shows the recommended carriageway widths for each road type. These are contextualised for Thoothukudi, based on IRC:86-2018.

Number of lanes	Width of Carriageway			
	Arterial Roads (ROW 45m, 60m)	Sub-Arterial Roads (ROW 30m, 36m)	Collector Roads (ROW 18m, 24m)	Local Roads (ROW 9m, 12m)
Single lane with raised kerbs	3.5m	3.25m	3.25m	3m
2-lane with raised kerbs	7.5m (0.5m of shyness near median)	7m (0.5m of shyness near median)	6.5m	6m
4-lane with raised kerbs	15m with median (0.5m of shyness near median)	14m with median (0.5m of shyness near median)	13m with median	NA

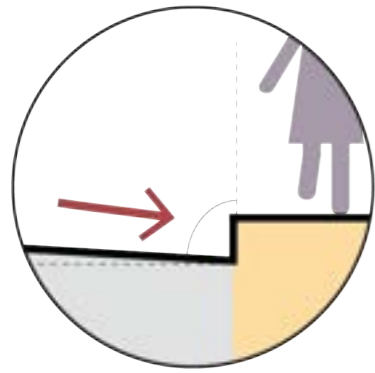
Minimum width of urban road without kerb shall be 5.5 m including allowances for a stalled vehicle and pedestrian movement.

4.5.3 Lane Width

Road lane marking on the carriageway is a crucial aspect of traffic management, enhancing safety and guiding motorists effectively. These markings, including lane dividers and symbols, play a vital role in maintaining organized and efficient traffic flow on roads.

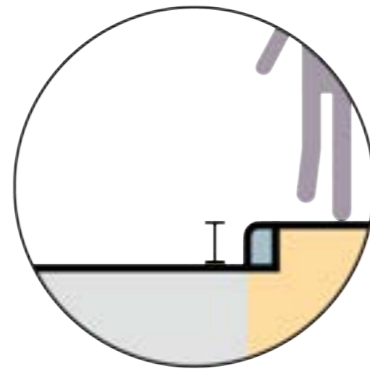


4.5.4 Carriageway Principles



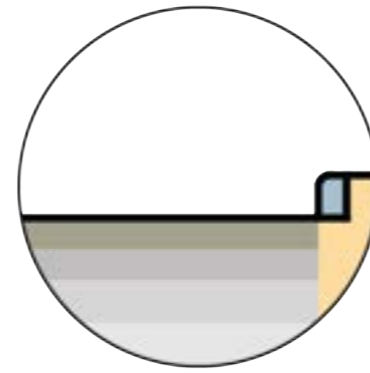
Drainage

The carriageway should have proper longitudinal gradient (minimum 0.3 %) and camber (1.5 to 2.5 %) to allow for surface runoff.



Surface

The carriageway should have even surface with level difference of top coat of carriageway and kerb of 150mm.



Construction in Layers

The carriageway shall have a compacted sub-grade with solid base and strengthened surface.

4.5.5 Construction in Layers

The carriageway layers are mentioned below in the order of top most to the bottom most layer. Refer IRC 250:2013 for more information.

Carriageway Layers (Top to bottom layers)	Depth of carriageway layer			
	Arterial Roads (ROW 45m, 60m)	Sub-Arterial Roads (ROW 30m, 36m)	Collector Roads (ROW 18m, 24m)	Local Roads (ROW 9m, 12m)
Surface Layer Bituminous Concrete (BC)	40-50mm	40-50mm	40mm	30mm
Intermediate Layer Dense Bituminous macadam (DBM)	Refer IRC 81: 2022, 37:2018 for calculation reference based on soil bearing capacity and traffic axle load.			
Intermediate Layer Metalling followed by tac coat				
Base Layer Wet mix macadam (WMM)				
Sub Base Granular Sub Base				
Sub Grade				
Earthwork Excavation				

Refer IRC 58: 2015 for Rigid Pavement Roads.



Pondy Bazaar, Chennai
Image Source - Elements Creative India

4.6 Bus Priority Lane (BPL)

A bus priority lane is a designated lane on carriageway reserved primarily for buses to help them move faster and more reliably than general traffic. By giving buses dedicated or preferential space, these lanes reduce delays caused by congestion, improve travel time consistency, and make public transport more efficient and attractive. BPL can break this vicious cycle by maintaining competitive travel times and reliable scheduling in road-based public transport.

Bus lanes are of two types – Kerb side bus lanes and Median bus lanes. Considering Chennai's context, Kerb side bus lanes are recommended. Refer to IRC 70: 2017

Bus priority can take different forms:

- Exclusive lanes – only buses are allowed at all times
- Time-based lanes – reserved for buses during peak hours
- Shared priority – buses with other modes (eg. Shared IPT and bus priority lane) (Not recommended)

Challenges

- **Traffic heterogeneity:** Managing high volumes of mixed traffic often leads to encroachment into bus lanes, reducing their effectiveness.
- **Operational gaps:** Limited system management, inefficient operations planning, and frequent property access points disrupt lane continuity and performance.
- **Access and safety:** Inadequate pedestrian crossings and poor integration with walking and cycling infrastructure create barriers to safe bus stop access.
- **Weak enforcement:** Inconsistent enforcement allows misuse by private vehicles and intersection blockages, affecting bus reliability.

4.6.1 Design

Right of Way (RoW):

BPLs are recommended for RoW of 36 m and above

Lane Width:

A dedicated lane width of 3.5 m should be maintained,

Bus Stop:

Bus stops are provided at the kerb edge in MUZ

Pedestrian Crossing:

Safe pedestrian crossings must be provided near bus stops

Lane Demarcation:

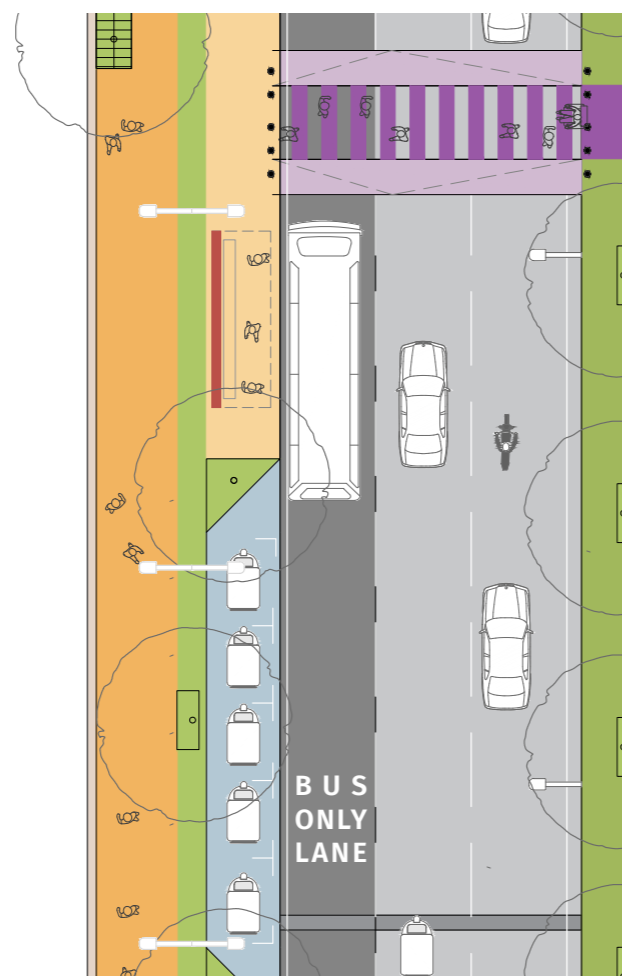
BPLs should be clearly defined through physical segregation or road markings, depending on ROW

Signal Priority:

Buses should be supported with priority at intersections through dedicated signal systems.

Continuity of Lane and Access Management

Continuous uninterrupted BPL stretches with minimal disruptions from property entrances and side streets through controlled access design.



Bengaluru
Source: FILE PHOTO

4.7 Service Lane

Service lanes can increase the mobility function of the main carriageway while also maintaining liveability for non-motorised road users. Well-designed service lanes improve safety and thoroughfare of the carriageway on high-speed corridors such as arterial and sub-arterial streets and at-grade urban expressways by segregating property access points and parking from the main carriageway. Service lanes should be designed for slow speeds and should break in between with a designated entry and exit, to avoid it being used as another carriageway lane.

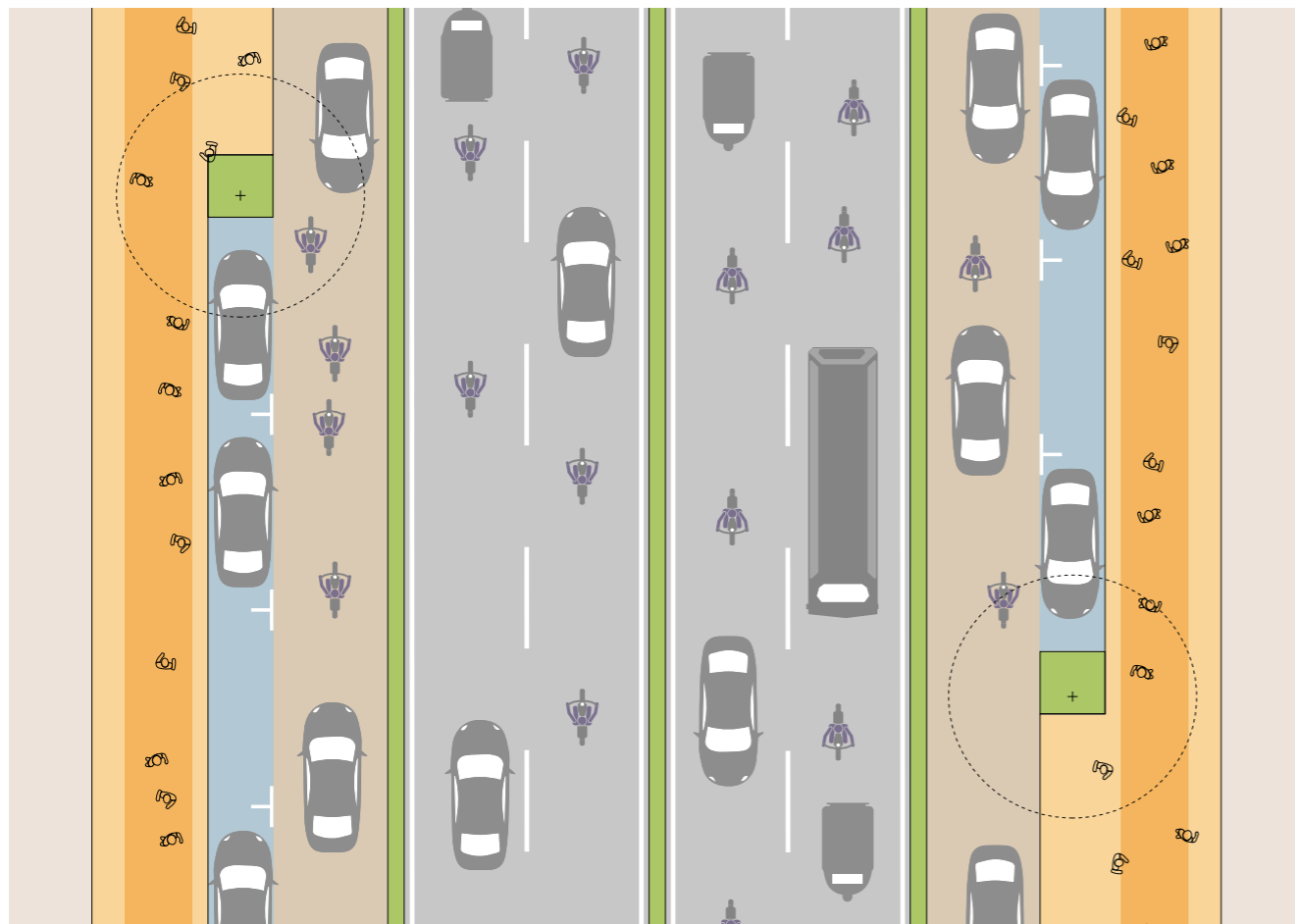
4.6.1 Criteria for Service Lane

A service lane can be considered on a high volume arterial streets (RoW >45m) or in sub-arterial street if one or both of the following criteria are met:

- i. Frequency of property entrances is more than once every 15 m
- ii. There is active public building use along the edges

A service lane should be 5.5m on each side as per demand and recommendation.

Access into and out of a service lane should be provided via a table-top crossing to ensure the footpath and cycle track continue at their original levels.



Service lanes that are too wide encourage fast driving, thus defeating one of the primary roles of service lanes: to provide safe pedestrian space. In particular, it is difficult to maintain priority for pedestrians on service lanes that are wide enough for two-way car movements. In addition, wide service lanes invite encroachment by shops, parked vehicles, or street vendors.



4.8 Elements of Intersection Design

The quality of an intersection can vary significantly, depending on the turning radii, the continuity of footpaths and cycle tracks and other design features. In addition to prioritising the movement of pedestrians, cyclists and public transit, the intersection design should be designed for low vehicular speeds. This section covers the basic elements of intersection design, which can help achieve the above vision. (Refer IRC 92:2017)

4.7.1 Turning Radius and Left Turn Pockets

Turning radius is relevant in the context of designing street corners and left turn pockets. Larger vehicles require more space in order to take a turn and hence intersection design must factor these in.

Design of turning Radius

Larger turning radii encourages faster vehicle speeds. Hence, tighter corners are preferred as they improve pedestrian and cyclist safety.

For local streets that cater to light vehicles, the turning radius shall be 4m.

The turning radius for streets that accommodate buses and trucks (Bus Route Roads) shall be 9m.

Maintain intersection angles close to 90 degrees for optimal safety and visibility.



Turning radius for smaller vehicles

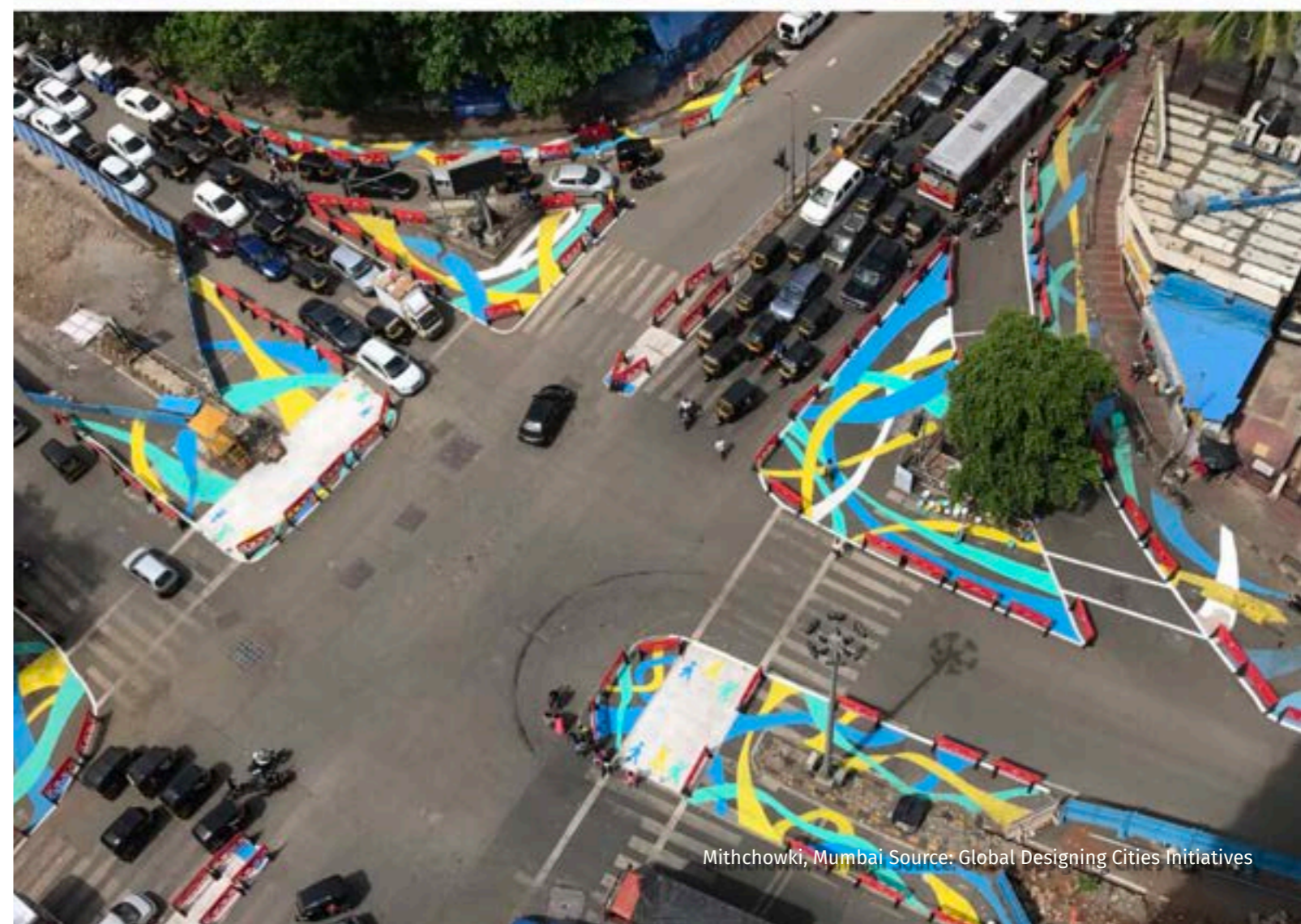


Left Turn Pockets

Left turn pockets can increase junction capacity by allowing vehicles to make free left turns. However, if not designed appropriately, they can compromise pedestrian safety.

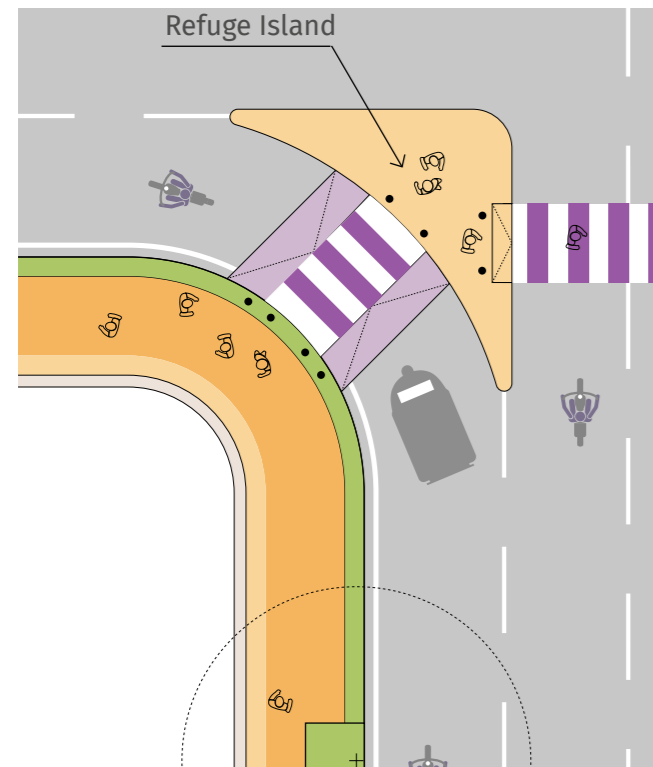
Traditionally, left turn lanes have been designed with a circular geometry. However, such a design is unsafe for pedestrians because it allows for fast vehicle movements.

The preferred design incorporates a 30° angle of approach. Since vehicles enter the outgoing arm at a more abrupt angle, they are compelled to reduce their speeds.



4.7.2 Refuge Islands

The design of street corners and turning lanes must account for the turning radius, especially for larger vehicles that require more space to manoeuvre. At intersections, the unused triangular spaces created by turning lanes (known as channelizers) should be re-purposed as pedestrian refuges, since they often go unused by vehicles and accumulate debris. Properly designed channelizers improve safety by providing pedestrians with protected waiting areas while ensuring smooth turning movements for all vehicle types.



Location

Refuge islands should be provided at intersections where pedestrians have to cross more than two lanes of traffic in succession. These islands can also act as channelisers of traffic.

Height

Refuge islands should be at the same level as the footpath.

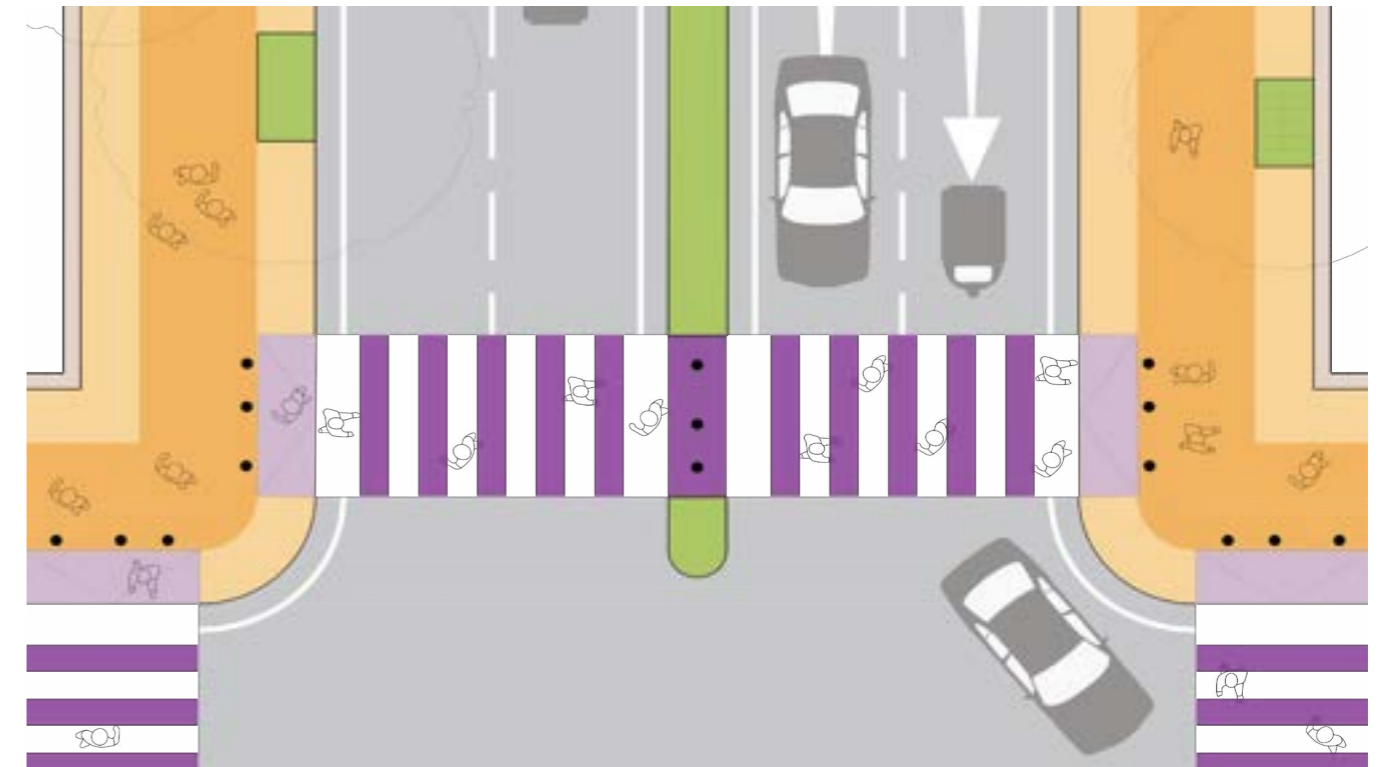
Tabletop crossings must be provided between the footpath and the refuge islands for safer crossing.

Refuge islands should be highlighted by reflective bollards. Light poles and signage, if any, should not obstruct pedestrians' movement and vision.



4.7.3 Pedestrian Crossings

Crossings denote areas for pedestrian movement while perpendicular traffic is stopped. Pedestrian crossings can be painted alone (without additional measures) at signalised intersections. At unsignalised intersections, painted cross-walks need to be accompanied by a physical measure such as a speed bump or speed table.



At-least 2m of width should be provided for the pedestrian crossing. Along arterial and sub-arterial streets, 3-4m wide pedestrian crossings can be provided.

Pedestrian refuge width

For a safe and inclusive pedestrian refuge, for people with strollers, wheelchair, cycles; a minimum 1.5m width of refuge should be provided. The refuge island shall be at the level of carriageway to ensure access to wheelchair and free from any landscaping.

Bollards

Bollards should be placed in the refuge to prevent motor vehicles from turning.



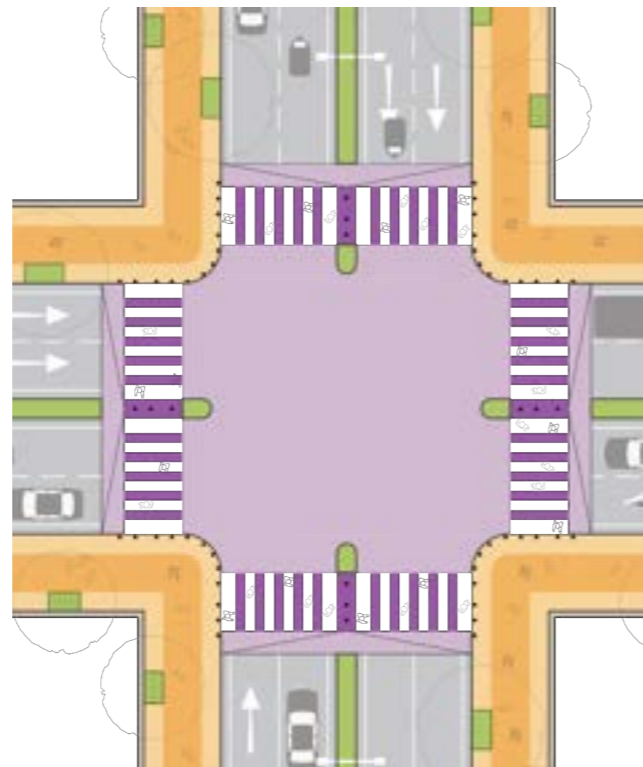
4.7.4 Other Elements

Levels

The level of the carriageway at intersections and pedestrian crossings can be raised to that of the footpath or cycle track, through the use of ramps, in order to improve safety and convenience for pedestrians.

Unsignalised intersections shall be raised since pedestrian safety is not ensured by any other means. If raising the intersection prevents adequate vehicle throughput, then ramps should be installed at least on left turn pockets.

Signalised intersections can be raised if warranted by safety concerns.



Bollards

Bollards help define refuge islands and other pedestrian spaces and prevent vehicles from driving over these spaces. Bollards are especially helpful when a pedestrian area is at the same level as the surrounding road surface.



4.7.5 Traffic Signals

Type of Signals

Fixed Time Signals

- Operate on a preset cycle with fixed green, amber, and red durations.
- Best for intersections with consistent traffic flow and no major fluctuations.

Traffic Actuated Signals

- Adjust timings based on real-time traffic conditions using sensors.
- Suitable for intersections with variable traffic demand.

Pedestrian Signals

- Provide dedicated crossing time for pedestrians.
- Include walk (green), don't walk (red), and flashing red for clearance time.

Flashing Signals

- Used at low-traffic intersections or for cautionary purposes.
- Typically flashing amber (proceed with caution) or flashing red (stop and proceed when safe).

Manual Signals

- Controlled by traffic police using hand signals or temporary lights.
- Used in case of signal failure, special events, or emergencies.

Pelican Signals

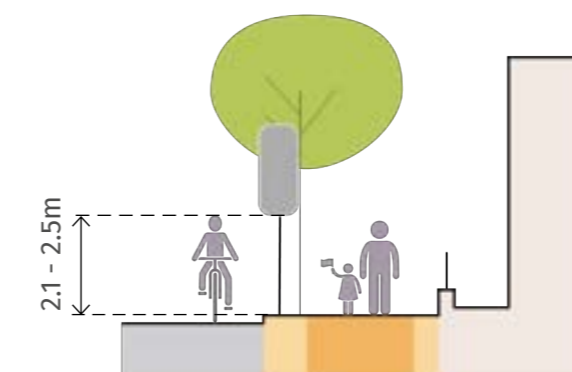
- Pedestrian-activated signals that stop traffic only when a pedestrian presses a button.

Signal Placement Criteria

Consider putting a signal at the crossing if:

- Pedestrians have to wait more than 45 seconds to cross the street.
- Traffic speed increases from 40kmph for 2 lane undivided road, 60kmph for 4-lane divided road and 80kmph for 6-lane divided road.
- It is recommended to put signal at crossing on 6 lane divided street or one way street with more than two lanes (as it is difficult to cross more than two-lanes)
- Audio signals should be installed at entry, exit and important movement junctions such as entrance lobby, lift, stairways, escalators, etc.

Refer IRC: 103-2022 for more information.

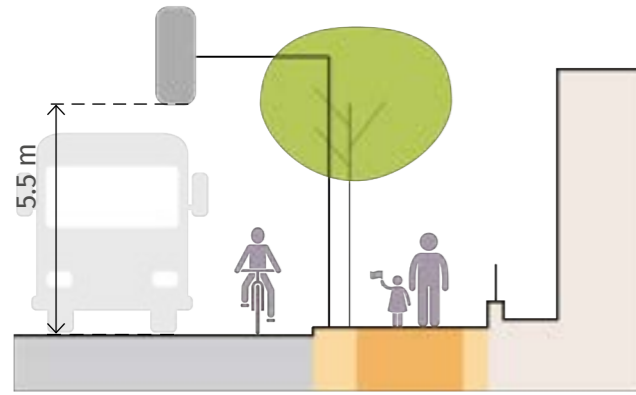


Height and Positioning

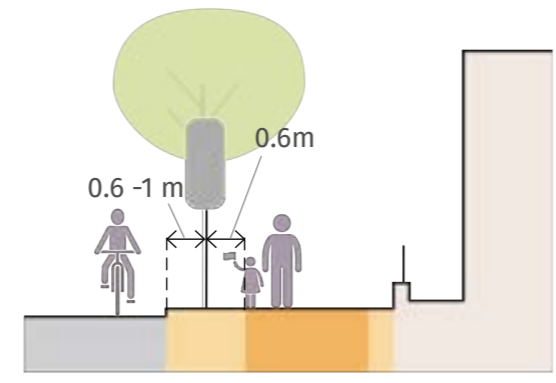
The bottom of the signal housing should be at a height of 2.1 to 2.5 meters above the finished footpath level.

Ramps provided at left turns to ensure pedestrian safety in Wardha Road, Nagpur

Vehicular Traffic Signals in Chennai



For signals suspended over the street, the height must be 5.5 meters above the road surface.



Lateral Placement

Signals should be positioned between 600 mm and 1 meter from the edge of the carriageway to avoid obstruction and ensure visibility.

Pit Size of Pole Foundation

900mm x 900mm x 1050mm depth.

The poles shall then be embedded in M 200 concrete to a minimum of 300 mm below ground level and 300 mm above ground level.



Pelican signals in Bengaluru
Image Source: Indiamart



Pedestrian and cyclist signals in Chandigarh

Considerations for Persons with Disabilities

- All visual signage and information should be supplemented with audio announcement and digital displays
- Pedestrian traffic lights should be provided with clearly audible signals for the benefit of pedestrians with visual impairments
- Acoustic devices should be installed on a pole at the point of origin of crossing and not at the point of destination. In noisy areas, any spoken information should be repeated at least once. Audible traffic signals should operate at least 15dB over the prevailing sound level, with a maximum of 140dB;
- The installation of two adjacent acoustic devices such as beepers is not recommended in order to avoid disorientation; and
- Acoustical signals encourage safer crossing behaviour among children as well.

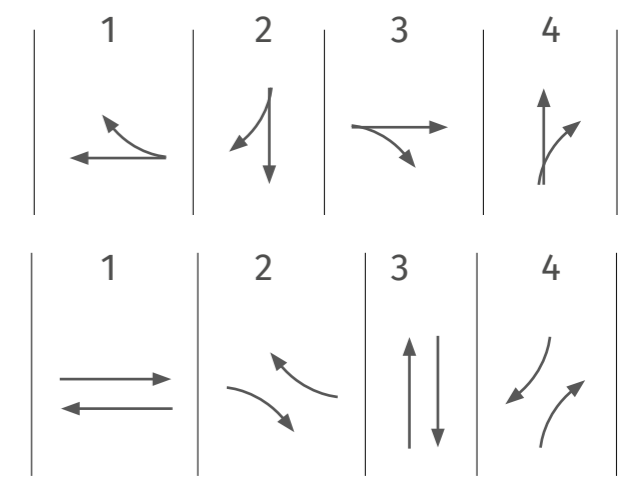
Refer IRC: SP: 117-2018 for more information.

Signal Phasing

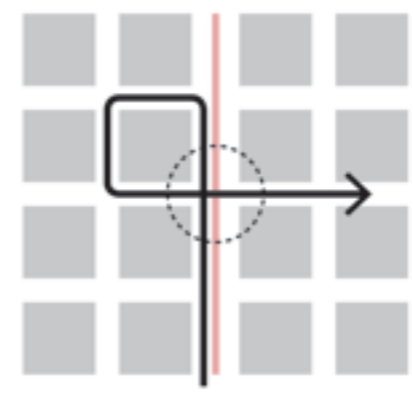
The physical layout of a intersection must be designed in conjunction with the signal phasing.

There are generally several possible sequences of signal phases. The optimal phasing design is determined by the relative volumes of the various movements taking place at an intersection.

For example, the diagram shows two standard phasing plans for a four-arm junction. (The diagrams assume that left turns are uncontrolled and can occur during any phase.) Phasing sequences ensure that the final vehicles from each phase are in a different part of the junction from the starting vehicles in the next phase.

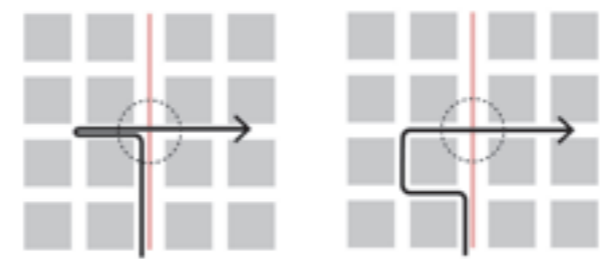


Two of the possible signal phasing options for a typical four-arm intersection alternately combine or separate the right turning and straight movements



The simplification of signal cycles through the elimination of turning movements can help reduce delay at intersections, particularly along BRT corridors.

Signal cycles also can be simplified through changes at the network level. For example, a right turn can be substituted by three left turns.



In order to reduce intersection delay along a BRT corridor, intersections can be simplified by prohibiting right turns across the BRT corridor. Vehicles can still make the right turn at the circled junction by turning left three times and then crossing perpendicular to the corridor. Two additional options are indicated below. In the diagram at left, the turn is accomplished through a left turn followed by a U-turn. In the diagram at right, vehicles make two right turns at less critical junctions away from the BRT corridor.

Determining of Cycle Lengths and Green Period Signalling

To calculate how long the pedestrian green light should last

- Divide the width of the road (in meters) by 1.2 meters per second (average walking speed). On streets with high children and elderly movement such as schools, hospitals, public parks, markets, and similar it is recommended to consider 0.45 m/s.
- Add 7 seconds for pedestrians' reaction time.
- The total is the green signal duration for pedestrians.

Things to note

- The total signal cycle time should be a multiple of 5 seconds.
- If it's not, round it up to the next multiple of 5.
- The maximum cycle length (waiting time when it is red) should not exceed 120 seconds
- The maximum cycle length should not exceed 120 seconds for smooth traffic flow.

4.7.6 Roundabouts and Rotaries

Roundabouts and rotaries are a signal-free solution to enhance intersection safety and efficiency. By consolidating conflict points and enforcing natural speed reduction through geometric deflection, they significantly reduce severe crashes—particularly high-risk right-angle collisions common in unsignalised intersections.

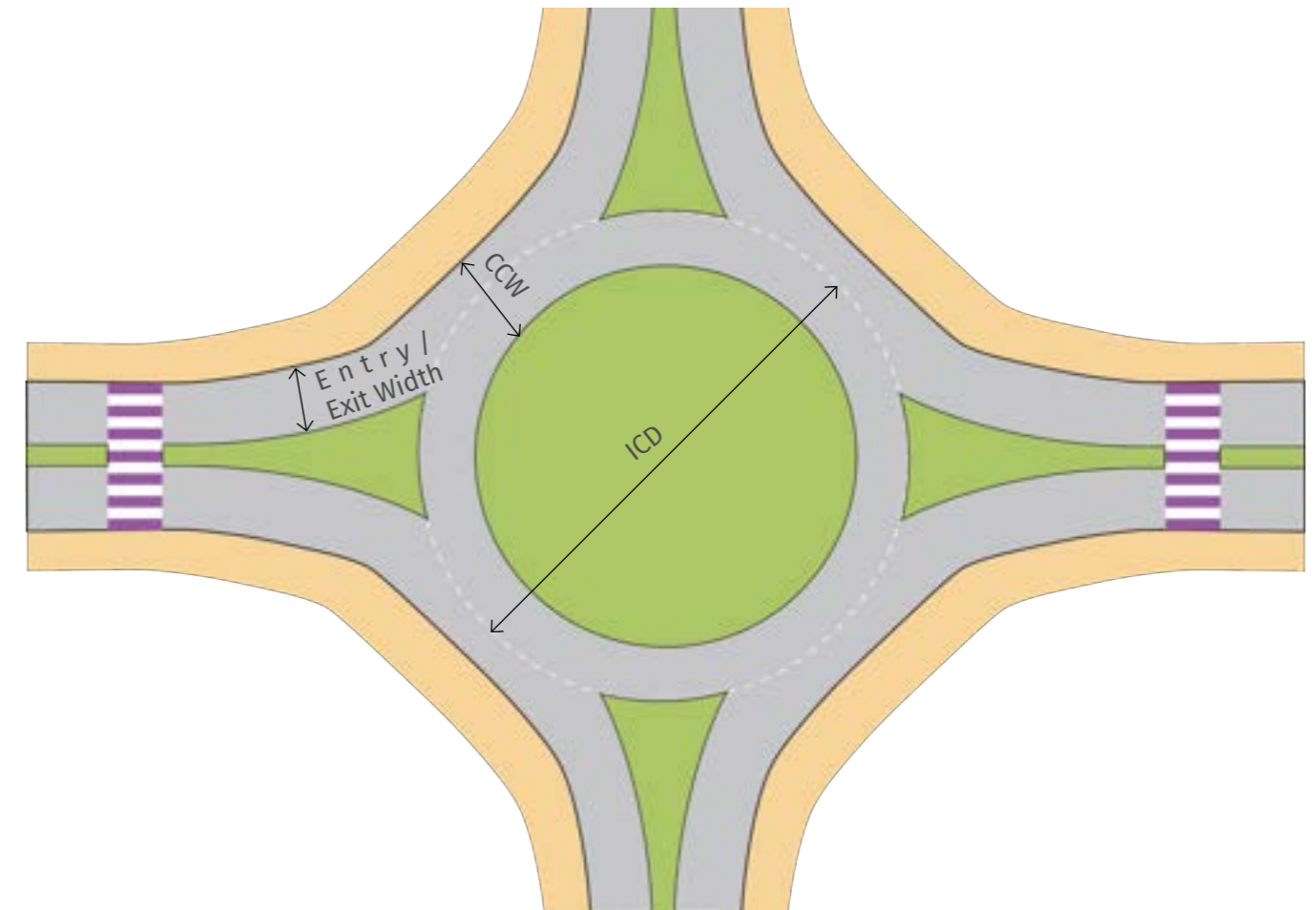
In small intersections the roundabout itself as well as the islands in the centre of the four street arms may be constructed with truck aprons that are surmountable by trucks and buses but not by cars and two-wheelers. Such a design accommodates the larger turning radius of heavy vehicles while maintaining a smaller turning radius for other vehicles. (Refer IRC 92:2017)

Roundabout	Rotary
Smaller in size, recommended for minor intersections	Larger in size, recommended for larger intersections
Enforces lower speeds (<40 kmph)	Higher speeds are permissible (>40 kmph)
Based on yield-at-entry principle (self regulating movement of vehicles)	Based on weaving behaviour between entering traffic from the approach road and the circulating stream
No pedestrian activity on central island	Pedestrian crossing to and from the central island is permissible



Khandoba Junction in Pimpri Chinchwad designed as a multi-lane round

Design of Roundabouts and Rotaries



Parameter	Roundabout		Rotary
	Single Lane Roundabout	Multi Lane Roundabout	
Inscribed Circle Diameter (ICD)	28 – 40 m	40 – 70 m	> 70 m
Entry / Exit Width	Same as CCW (Min 6m)	9 – 12 m	12 – 15 m (0.5 to 0.75 times the approach width)
Circulatory Carriageway Width (CCW)	12 – 8 m	1 – 1.2 times entry width	
Lane Configuration	1 lane	2-3 lanes	>3 lanes

Pedestrian and cyclist crossings and refuge islands shall be provided even in the case of a roundabout or a rotary, ensuring safe crossing of pedestrians and cyclists at the intersection. This will ensure continuity of infrastructure for pedestrians and cyclists, making it a comfortable experience for them. Refer IRC: 65-2017 for more details on roundabouts and rotary design.

4.8.7 At-grade treatment for grade separators

Pedestrian Continuity

- Continuous, obstruction-free footpaths should be provided on both sides of the carriageway beneath grade separators.
- Pedestrian crossings should be provided at-grade along natural desire lines at regular intervals.
- Pedestrians should not be forced to take long detours or rely solely on grade-separated facilities.
- Signalized or raised pedestrian crossings should be introduced where traffic volumes are high.
- All pedestrian infrastructure should be universally accessible, including provision of ramps, tactile paving, and adequate widths.

Intersections

- Intersections beneath or adjacent to grade separators should be designed as complete intersections, ensuring safe movement for all users.
- Pedestrian crossings should be provided on all arms of the intersection, with refuge islands where crossing widths are large.
- Signalization should be introduced where warranted to manage conflicts between movements.
- Slip lanes shall be encouraged in arterial and sub-arterial roads; where provided, they should include raised pedestrian crossings and tight corner radii.
- Adequate sight distances should be maintained for all users at intersections.
- Public transport stops should be integrated without obstructing pedestrian movement.

Developments below grade separators

example: Vadapalani flyover, Anna Flyover etc.

- Adequate lighting should be provided to eliminate dark and unsafe areas.
- Turning radii at junctions beneath grade separators should be minimized to reduce vehicular speeds.
- Safe pedestrian crossing shall be ensured to access the developments below grade separator.
- If play spaces are designed below the grade separator, necessary safety measures are to be taken
- Proper drainage systems should be incorporated to prevent waterlogging.

Traffic Management and Circulation

- A clear hierarchy of movement should be established, with through traffic prioritized on the grade separator and local traffic managed at-grade.
- Entry and exit ramps should be designed to minimize conflict points and avoid weaving movements near intersections.
- Adequate merging and diverging lengths should be provided for smooth traffic flow.
- Traffic calming measures should be incorporated at-grade to reduce vehicle speeds.
- Road signage and lane markings should be provided to guide traffic and improve lane discipline.
- Safe and direct access should be ensured for pedestrians and public transport users.



4.8.8 At-grade treatment for Interchanges

Pedestrian Continuity

- Safe and direct pedestrian routes should be provided across and around interchanges, aligned with natural desire lines.
- Frequent, at-grade pedestrian crossings should be provided with appropriate traffic control measures.
- Pedestrian facilities should be well-lit, visible, and designed to enhance safety and comfort.

Access control management

- Access points should be limited and clearly defined to reduce conflicts and improve safety.
- Informal and unsafe access points should be restricted through design interventions.
- Medians, channelizers, and barriers should be used to guide vehicular and pedestrian movements.
- Pedestrian crossings should be provided only at designated, safe locations.

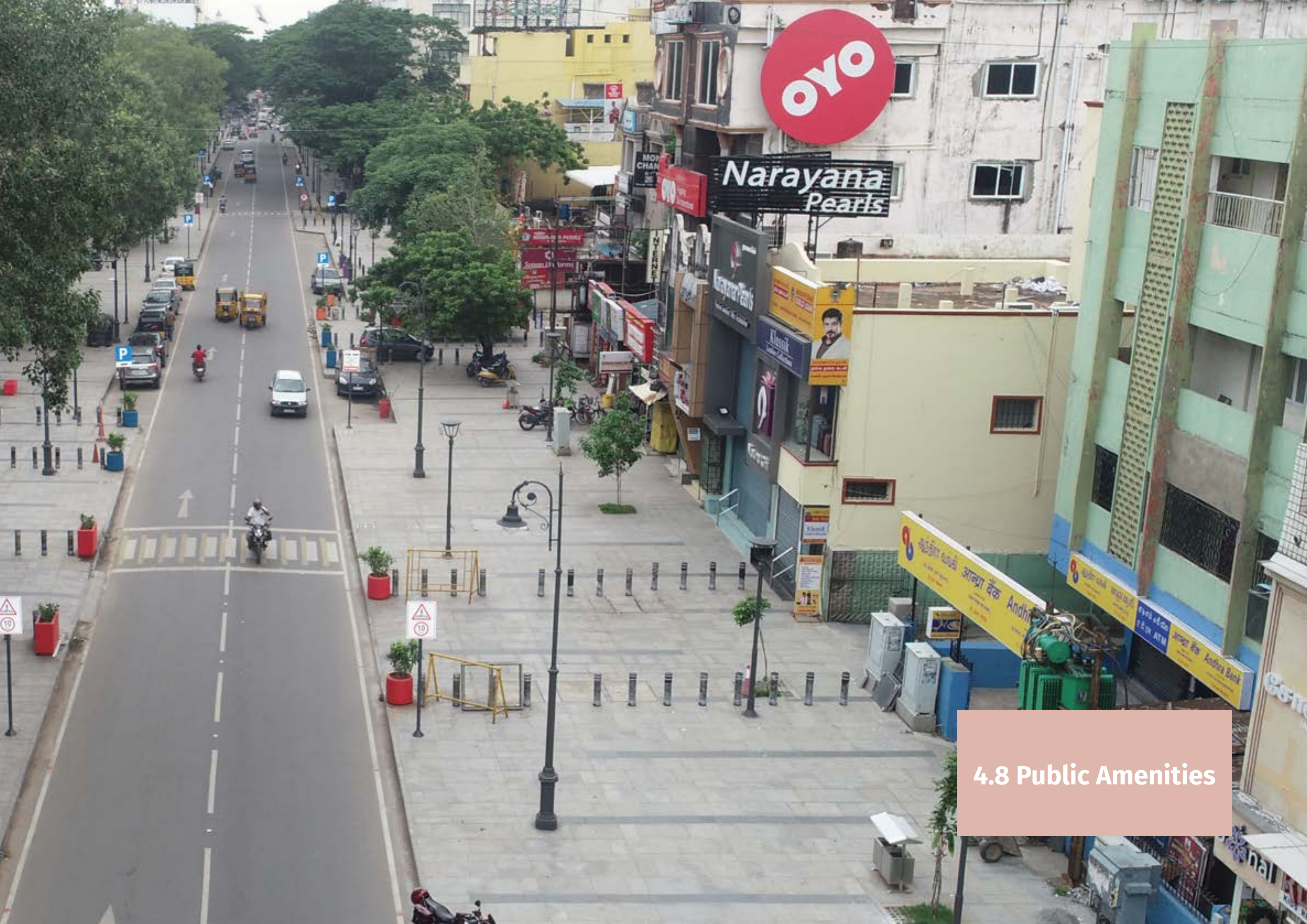
Circulation and traffic Management Plan

- Traffic circulation should be simplified to reduce conflicts and improve legibility for all users.
- Local and through traffic movements should be clearly segregated.
- Dedicated turning lanes should be provided to streamline vehicular movements.
- Multimodal integration should be ensured through provision of bus bays, intermediate public transport stands, and pick-up/drop-off areas.
- Wayfinding signage should be provided to guide users through the interchange.

Safety Issues

- Speed management measures such as raised crossings, rumble strips, and reduced turning radii should be incorporated.
- Continuous street lighting should be provided across all at-grade areas.
- Road markings and signage should be clear, visible, and regularly maintained.
- Guardrails and pedestrian barriers should be used judiciously to enhance safety without restricting movement.
- Surveillance and emergency access provisions should be incorporated where required.



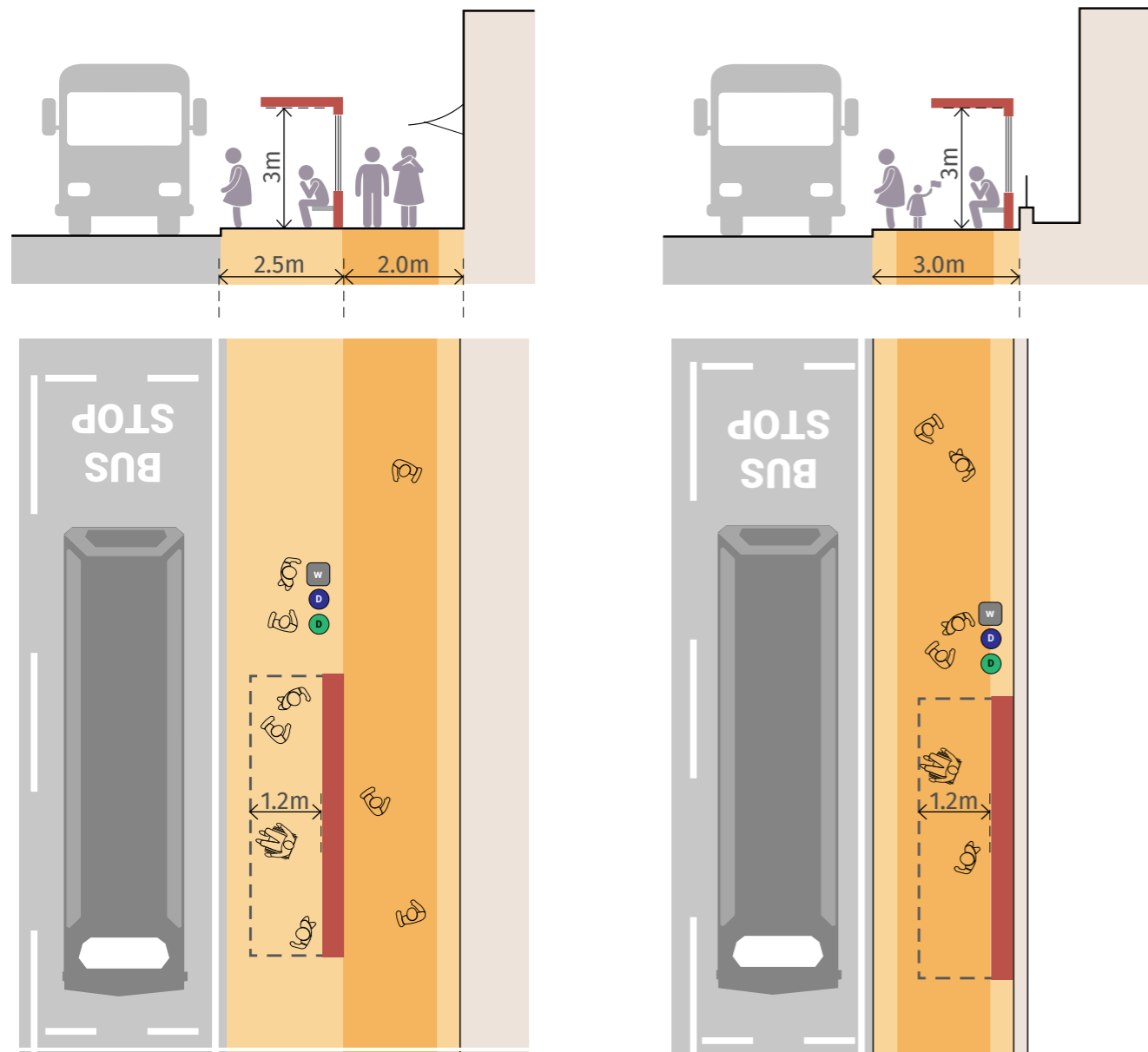


4.8 Public Amenities

4.8.1 Bus Stops

Bus stops provide safe and comfortable waiting spaces. They should be located such that they are easy to identify and do not obstruct the walking zone. Bus stops should be oriented such that buses can pull-over in their original path and do not need to get into a niche (bus bay), thus ensuring smooth movement of traffic. A typical bus stop shelter should be **9m x 2.5m** in size. The length of the bus stop should be determined based on the number of buses and expected volume of buses using the stop. For seamless multi-modal integration, relocate the existing bus stops wherever necessary to the nearest public transport interchange options. Ensure the placement of new bus shelters in closer proximity to other modes of public transport.

4.8.1.1 Location



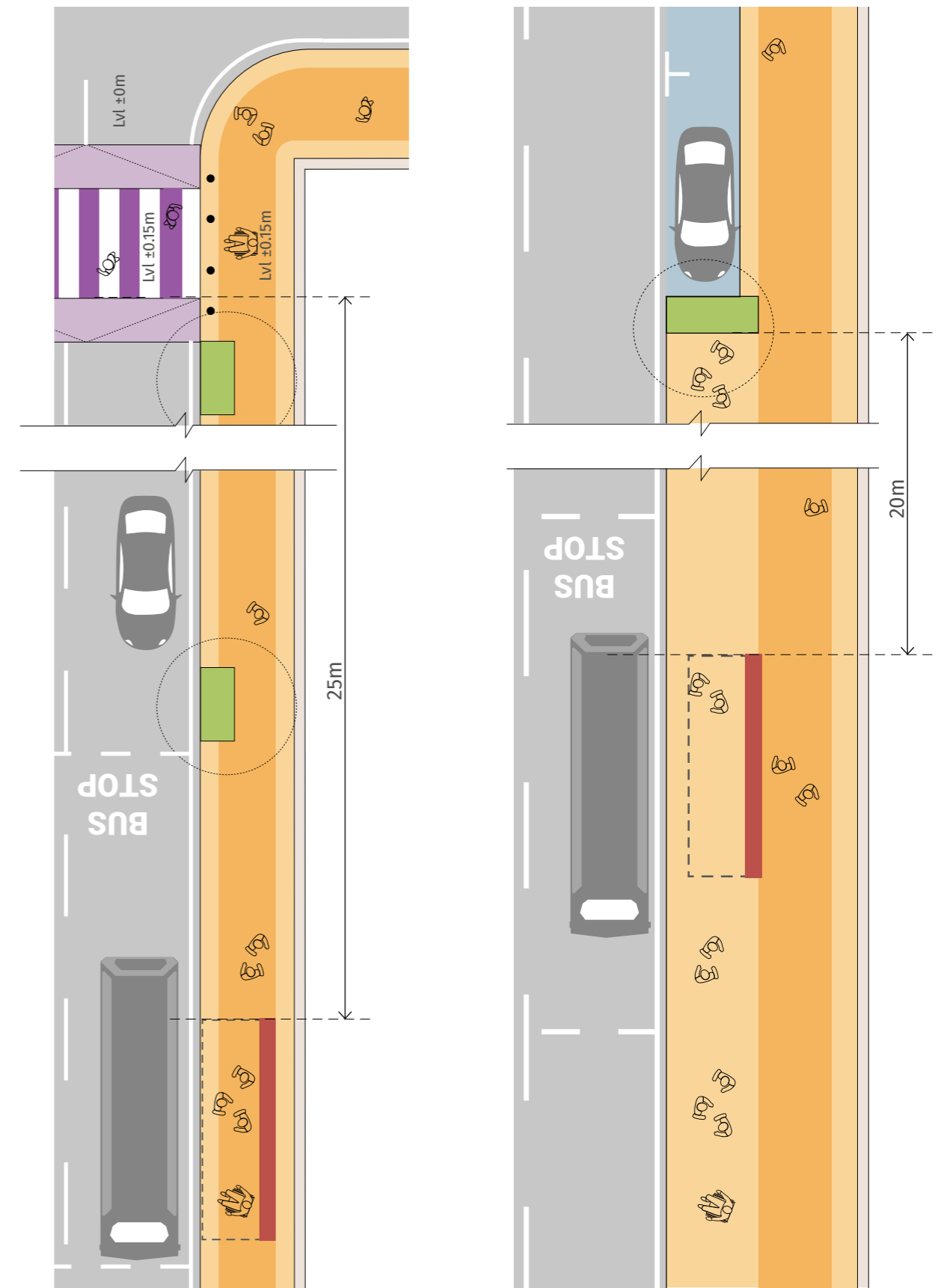
Footpaths >4.5m wide

For footpaths > 4.5m wide, bus stops should be in the SEC.

Footpaths <4.5m wide

For footpaths < 4.5m wide, bus stops should be pushed to the wall to ensure sufficient space in the front for walking zone.

4.8.1.2 Distance from Junctions and Parking



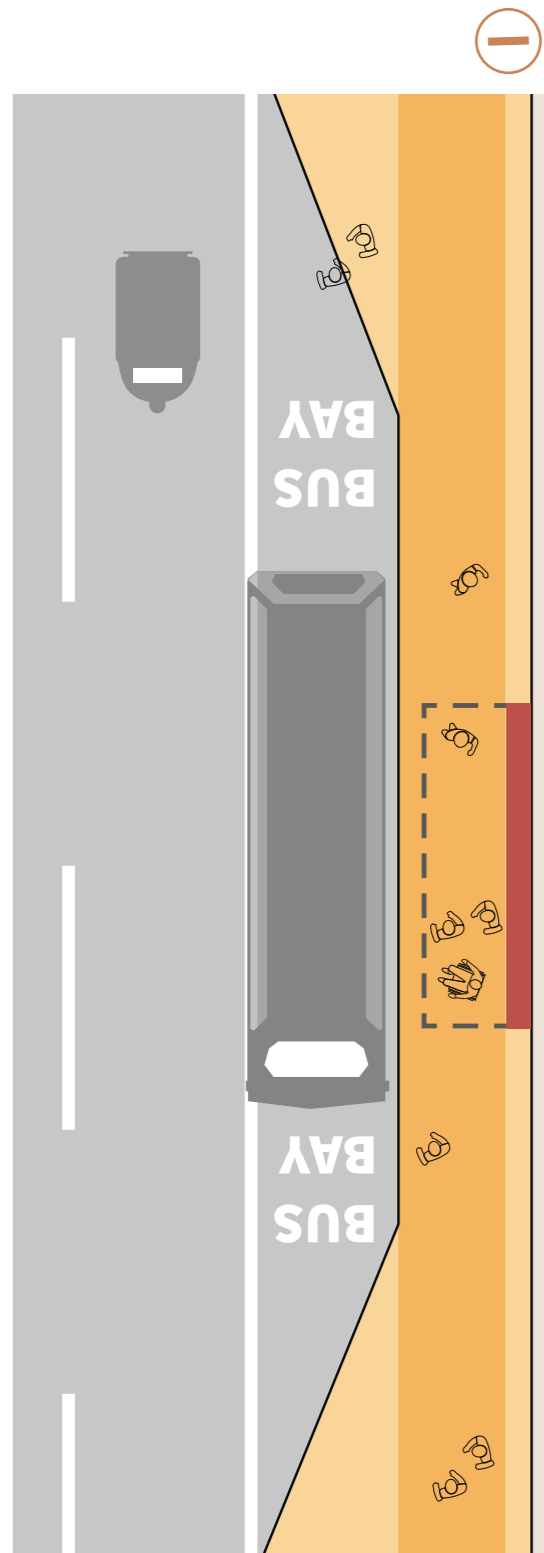
Distance from Junction

Bus stops should be located 25m from junctions with safe pedestrian crossings at the intersection.

Distance from parking bay

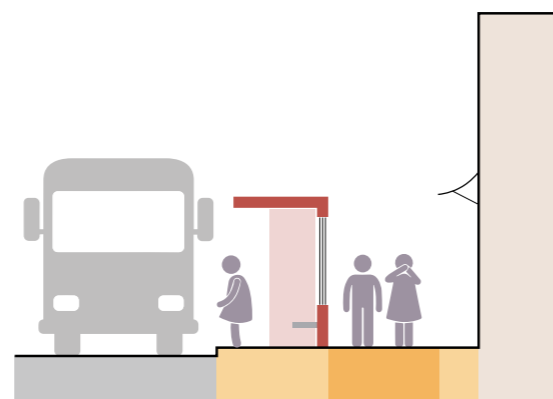
There should be no parking 20m before and after the bus stop to allow space for vendors, signage, and other needs.

4.8.1.3 Bus Bay Design



Bus Bay

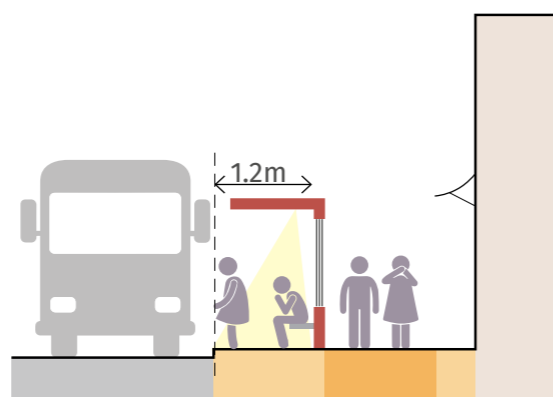
Bus bays should generally be avoided on urban streets because they make it difficult for buses to merge back into traffic, especially in areas with slow-moving but high-volume traffic. Additionally, bus bays are often misused for parking, obstructing bus operations. However, bus bays can be provided primarily on high-speed routes such as urban expressways and highways, based on the context.



Accessibility

Bus stops should be easy to locate, and should display information maps, up-to-date route number, direction of travel, major stops and helpline perpendicular to pedestrian movement on footpaths >4.5m wide and parallel to pedestrian movement on footpaths <4.5m wide

Bus stops should be at the same level as footpaths, and railings should not be provided along the kerb edge, as it obstructs the alighting path. If the bus stop platform is at a different level than the adjacent footpath, a ramp should be provided to ensure seamless access for boarding and alighting.



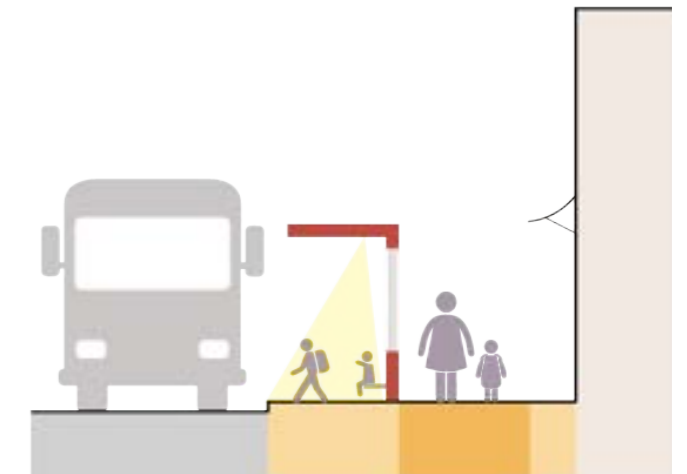
Comfort & Safety

There should be sufficient shade (recommended permanent roofing) and light with a clear waiting space of 1.2m wide in front of the shelter, having a seating to ensure comfort.

The back panel of the bus stop should be transparent to ensure safety.

4.8.1.4 Transit Station Design in School Zones

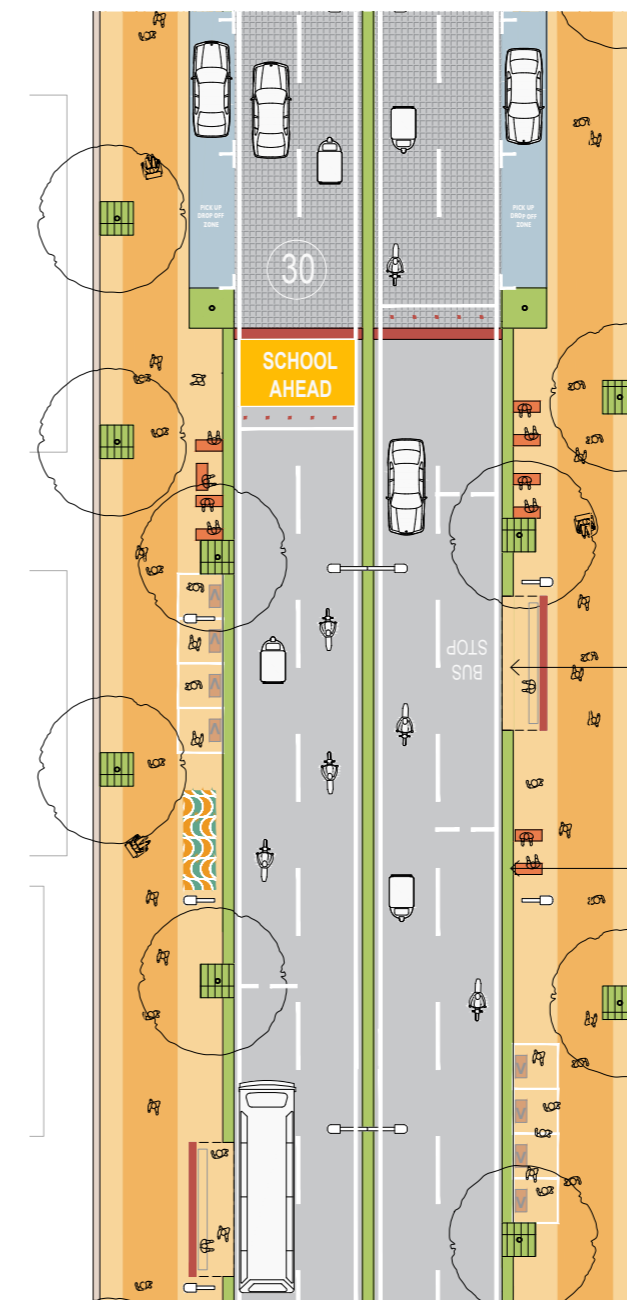
Seating at transit stops shall prioritise providing rest spaces for children and caregivers. Child height seating shall be provided across all transit stops—around schools, this applies to the transit stops within the School Zone.



Transit stops must be designed with cycle racks, trash cans and other facilities around School Zones.

Interactive Play Elements

Transit stops must be designed to incorporate child friendly 'pause and play' spaces where children can rest, play and learn. Colour, artwork, puzzles and games on the floor and walls of such waiting spaces including street furniture can invite children to engage and play.

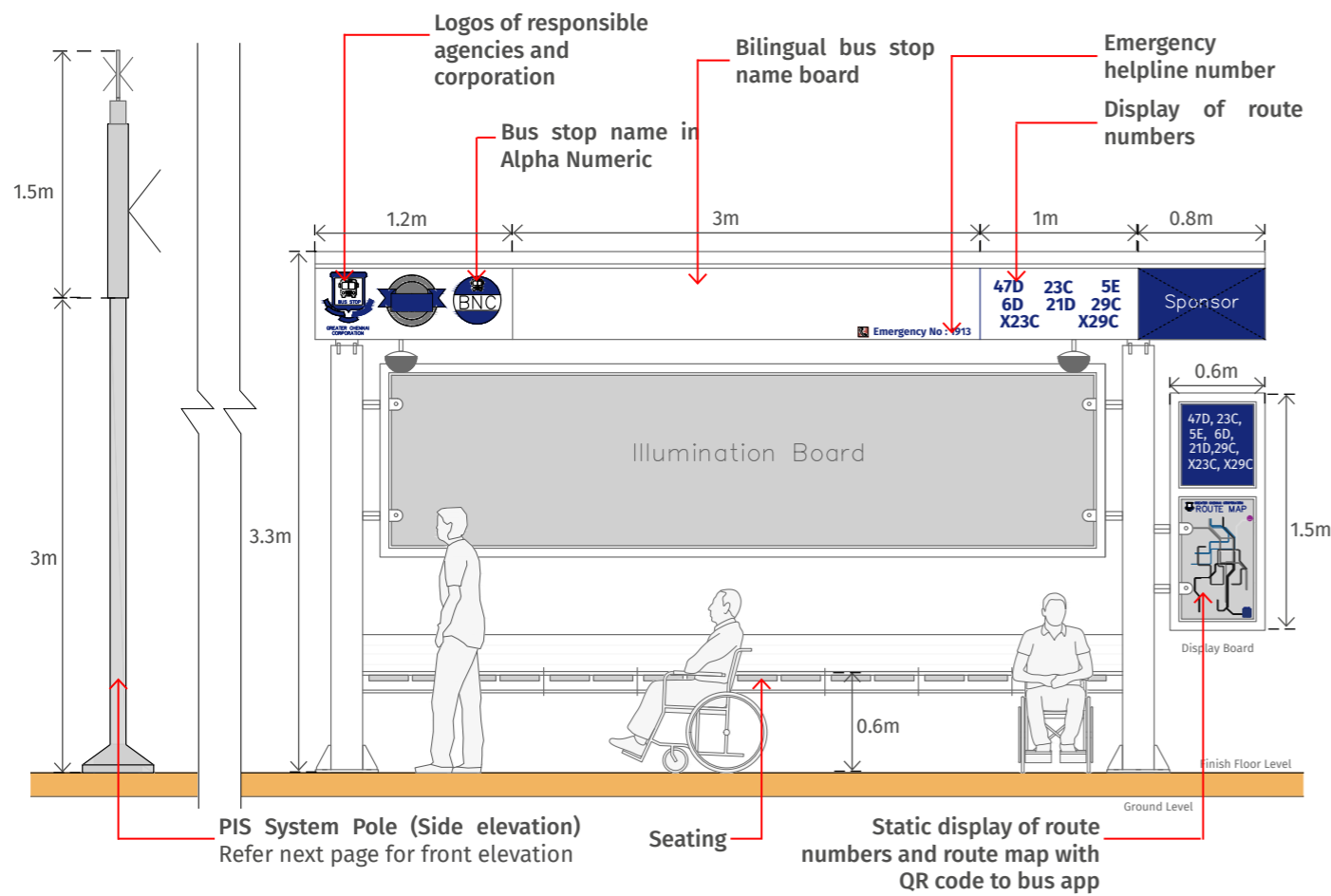


Bus Stop

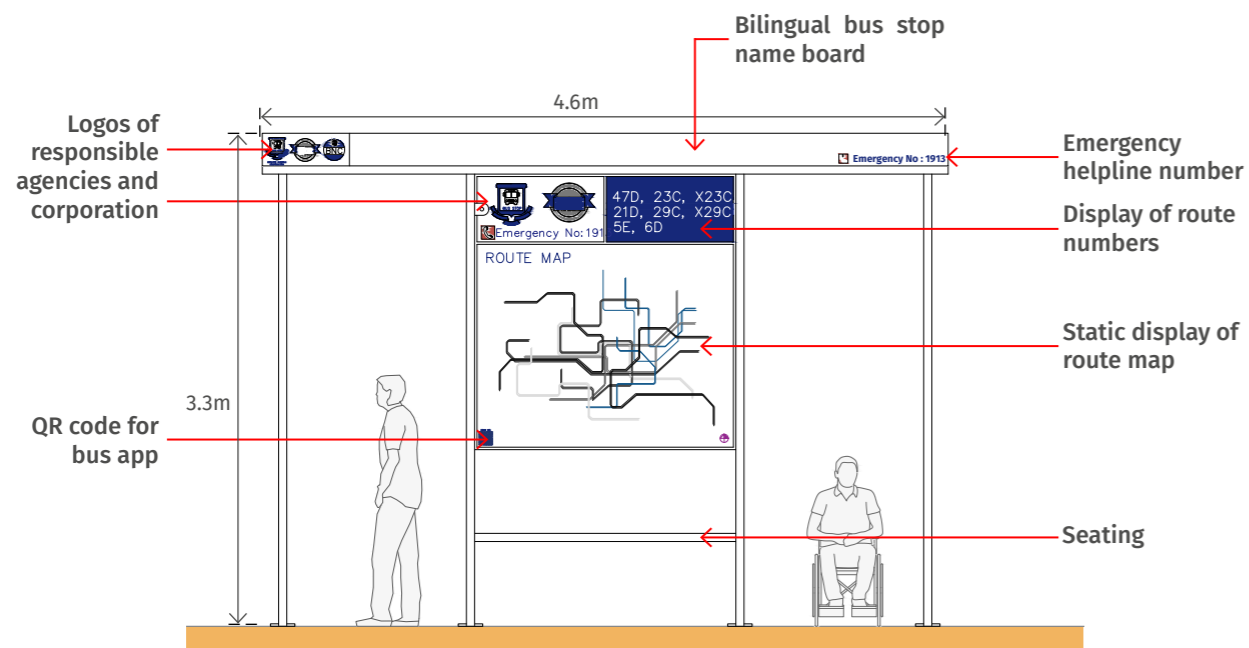
Public Bicycle Sharing Station / Cycle Parking
Public bicycle sharing stations or cycle parking shall be located at a preferable frequency of 300m, close to the cycle tracks in the SEC.

4.8.1.5 Information Panel Design

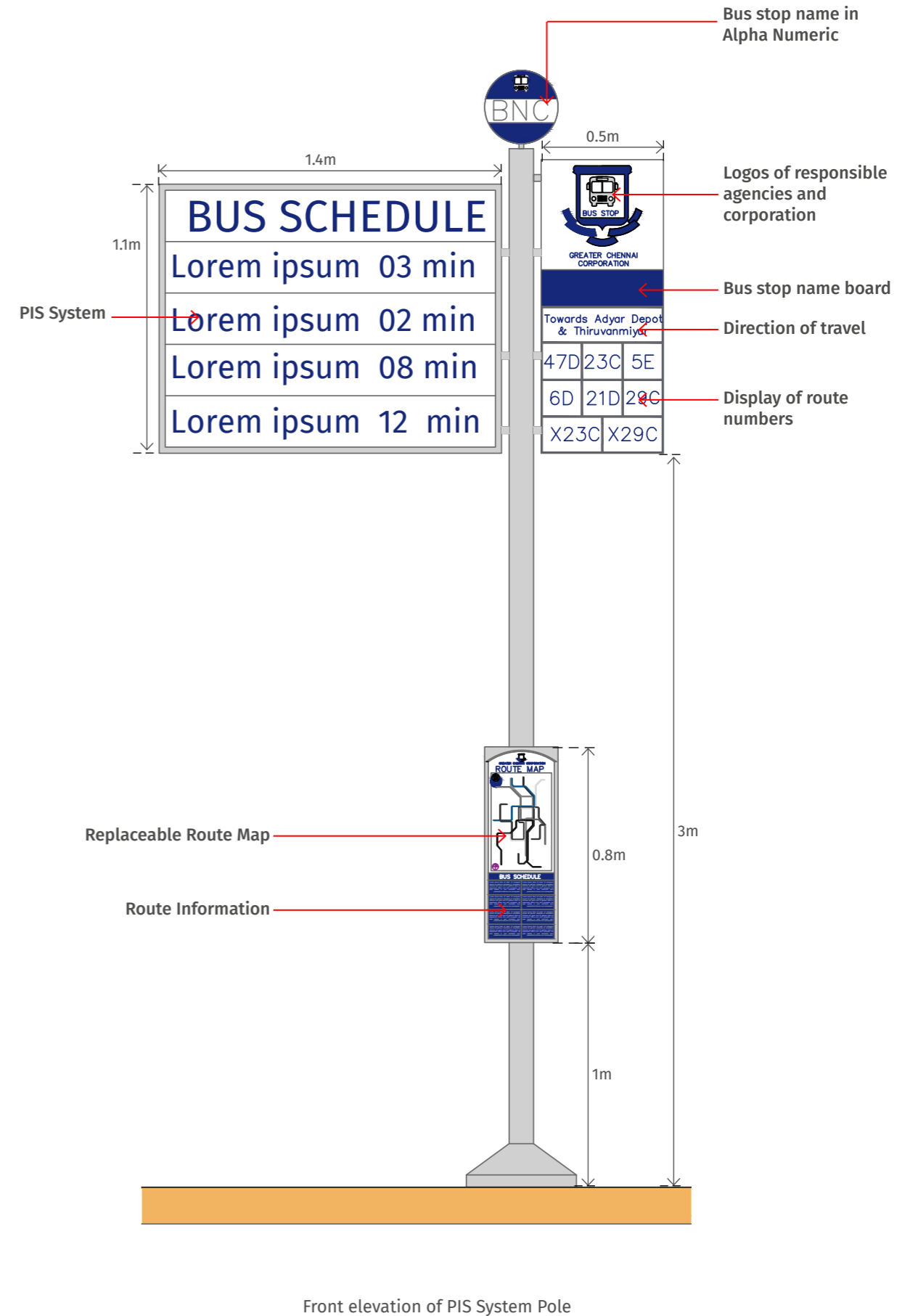
All bus stops, regardless of type (2-pole, 2-pole+panel, 3-pole), should have unique alpha-numeric codes with lat-long identification, standardized information panels displaying the bus stop name, bus numbers, and a route map. Integrating a Passenger Information System (PIS) ensures real-time updates, improving accessibility and reducing confusion for commuters.



Typical elevation of bus stop with information panels



Typical elevation of bus stop on narrow footpaths (<4.5m width) with information panels



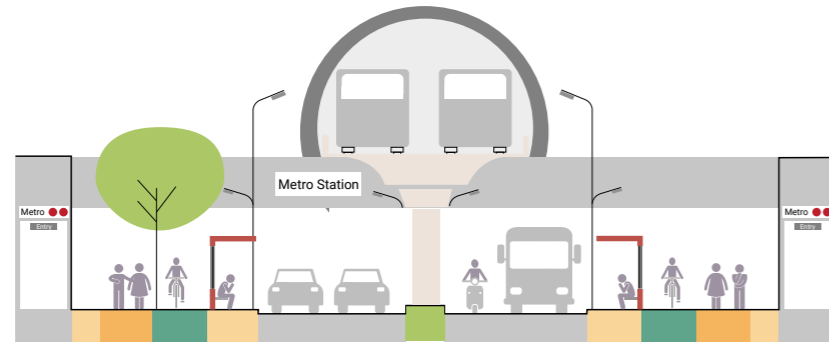
Front elevation of PIS System Pole

4.8.2 Metro/ Rail Station Entry & Exits

Seamless integration of Metro and rail station entries/exits with footpaths is essential to ensure safe, direct, and barrier-free access for commuters. Well-designed pedestrian connections reduce transfer time, improve station visibility, and encourage public transport use by making first- and last-mile movement comfortable and intuitive. Continuous footpaths, safe crossings, wayfinding, and universal accessibility at station frontages are critical to achieving a truly integrated transit network.

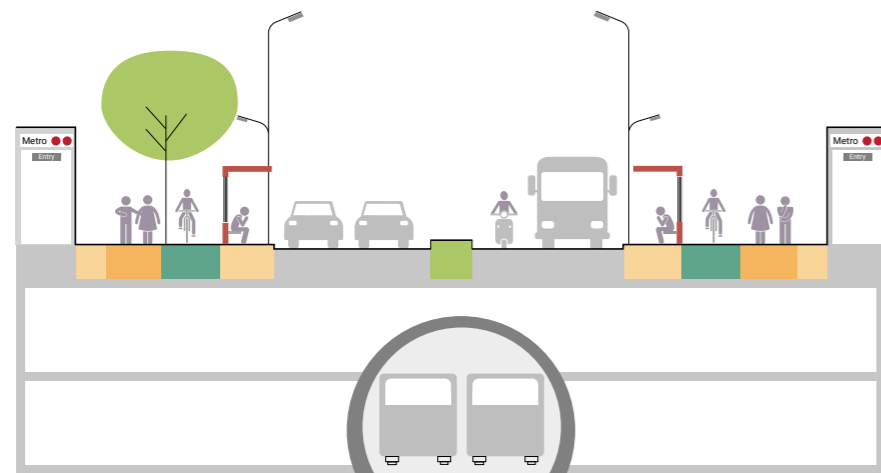
4.8.2.1 Elevated Stations

- Provide direct, barrier-free connections from staircases/escalators/elevators to the footpath without requiring road crossings.
- Ensure landing areas do not obstruct the walking zone—place them in the frontage or Street Elements Corridor.
- Provide shaded waiting space and clear wayfinding at the base of stairways.
- Ensure elevator access is universally accessible and located close to the main pedestrian flow.



4.8.2.2 Underground Stations

- Entries/exits should be positioned to maximise street visibility and provide short, direct routes to major pedestrian desire lines.
- Avoid placing station shafts within the clear pedestrian zone; integrate them within the frontage zone.
- Ensure sufficient lighting, CCTV coverage, and clear directional signage at entry plazas.
- Provide safe, signalised or raised crossings if entries open directly onto busy intersections.



Location of Station Access

Station entries/exits should open directly onto continuous, obstruction-free footpaths with a minimum of 2-4m of clear walkway. Avoid placing access points behind parking lots, compound walls, or discontinuous sidewalks.

Integration with Bus Stops

Bus stops should be located within 50m of station access to ensure seamless transfers.

Provide direct, safe, and shaded pedestrian links between the station and the bus stop.

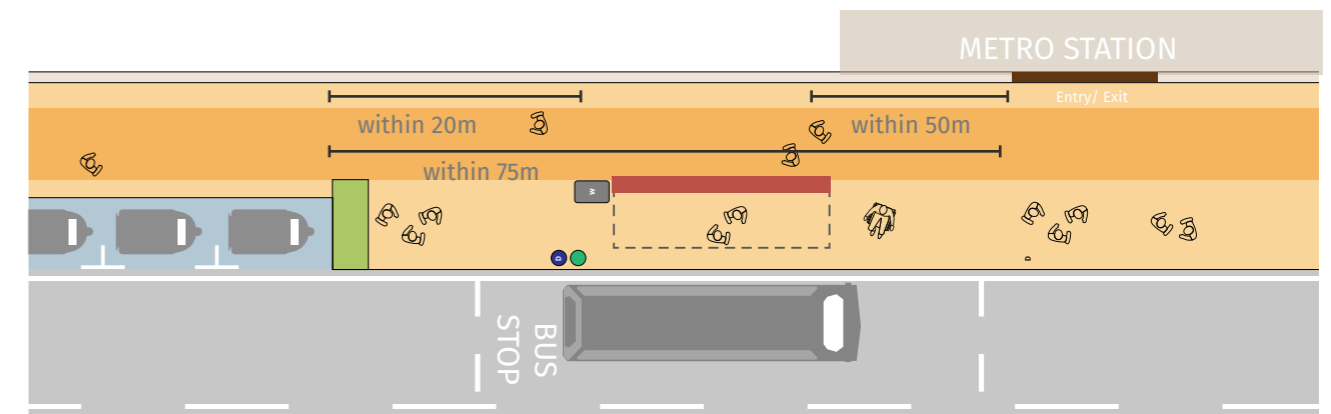
Ensure bus stop placement does not obstruct the walking zone or sightlines.

Integration with IPT Bays

IPT bays (autos, share autos, taxis) must be designated within 75 m of station entries/exits to support last-mile access.

Bays should be designed to avoid spillover onto the pedestrian zone or carriageway.

Provide clear signage and markings to manage queuing and prevent encroachment.



Parking restrictions and Pick-up an Drop off Bays

- No on-street parking should be permitted within 100 m of Metro station entrances/exits to maintain visibility, safety, and free pedestrian flow.
- On-street parking provided beyond 100m can be used for PUDO activities.
- The Parking Policy-approved no-fee cushion time should apply for PUDO activities to allow smooth short-duration stops.
- Ensure bays are well-marked, channelised, and supported with signage to prevent misuse or long-duration waiting.

Wayfinding & Visibility

Install clear, consistent wayfinding signage linking station entries to bus stops, IPT bays, and nearby landmarks.

Install clear wayfinding signs at street level indicating "Entry A / Entry B / Entry C".

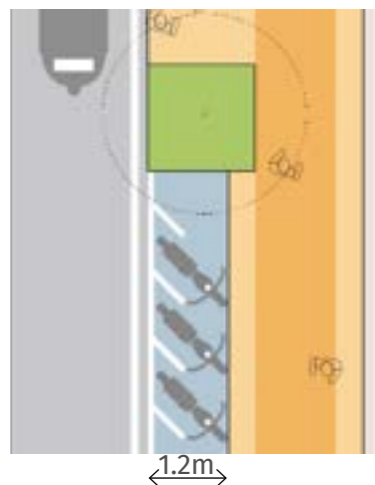
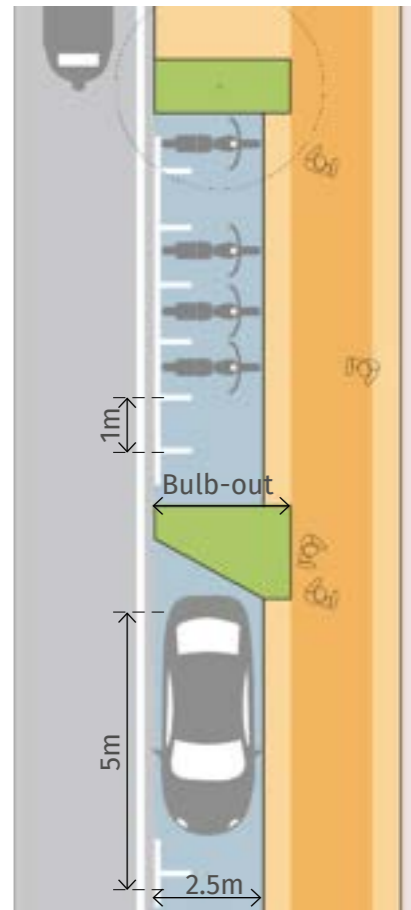
Maintain clear sightlines by removing obstructions near station frontage.



4.8.3 On-street Parking

On-street parking is a sub-optimal use of limited street space. On-street parking, if provided should move to off-street locations to ensure that the limited street space is prioritised to move people efficiently and allow people to sit, play and socialise. On-street parking should be clearly designated, limited and priced. Pricing manages the parking demand and enforcement ensures discipline.

4.8.3.1 Design



Orientation

Parallel parking is recommended for four-wheelers on streets where parking is essential. It saves the precious street space for public use and allows flexibility to accommodate perpendicular two-wheeler parking as well.

Bulb-outs in Parking bays

A maximum of five continuous car parking spaces shall be provided while designing parking bays. The bays shall be designed with bulb-outs to accommodate pedestrian lights, utility boxes, and street furniture without interruption.

Dedicated cycle and auto rickshaw parking should be provided at public transport stops and stations and in commercial areas, to facilitate multi-modal integration. A maximum of 8 autos shall be accommodated in a parking bay.

Kerb Edge

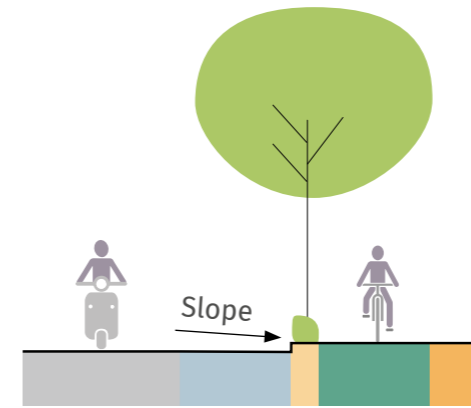
The kerb edge shall be positioned at a 45-degree angle to accommodate sufficient space of manoeuvring.

Narrow Streets

On narrow streets with high demand for two-wheeler parking, angular parking bays (1.2-1.5 m wide) are recommended.

Pick up and Drop off

Designated parking bays may serve as pick-up and drop-off zones. The no-fee cushion time permitted under the Parking Policy allows short, quick stops without charges, ensuring smooth passenger movement while preventing long-duration parking.



Surface

The area allotted for parking should have a clean and levelled surface, free from water logging with proper drainage facilities.

Visibility

Each parking bay should be clearly defined and marked to avoid haphazard parking. Appropriate parking signage giving information on timings, vehicle type parking and price should be provided.*

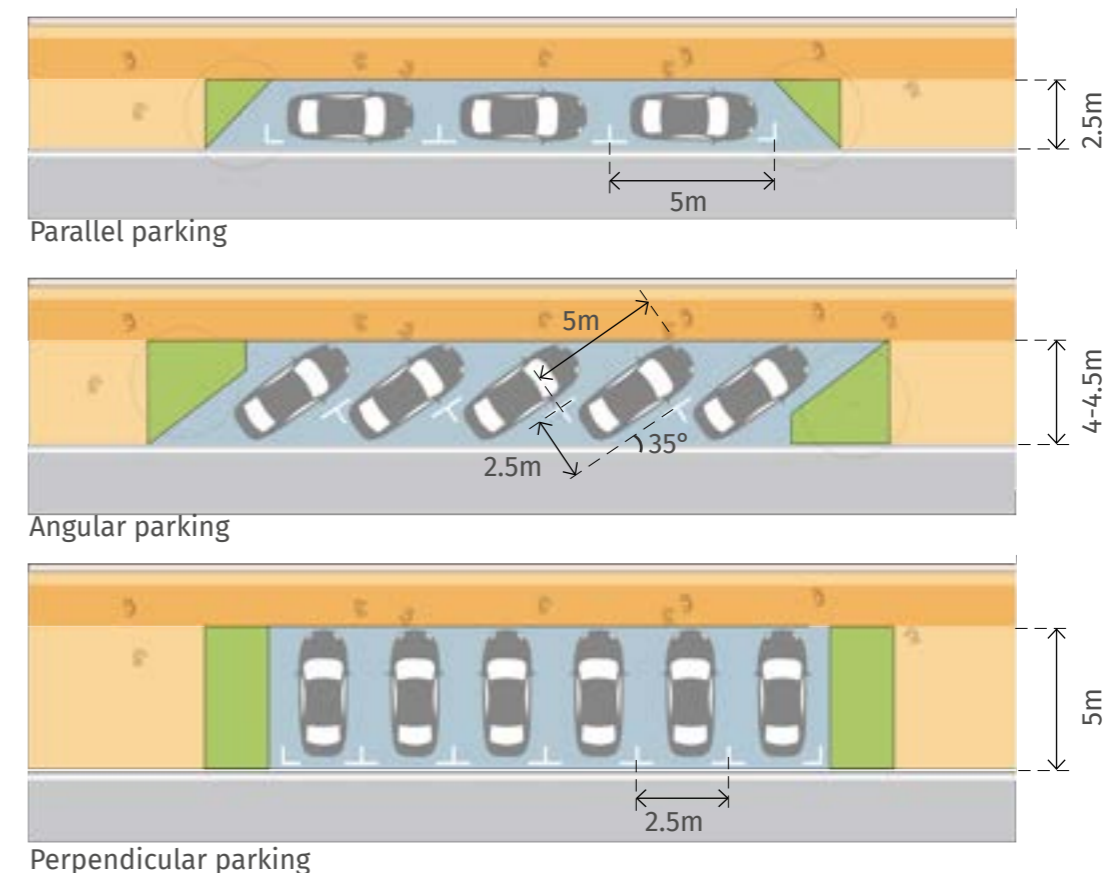
*Parking signage and markings should be provided as per IRC:67 and IRC:35 respectively.

Parking Space Dimensions

Vehicle Type	Parking bay Dimensions
Car	5m x 2.5m
2-wheeler	2m x 1m
Cycle	2m X 0.5m*
Auto-rickshaw, e-rickshaw	3m X 1.5 - 2m
Cycle-rickshaw	2.5m x 1m
Light Commercial Vehicle	5.5m x 2.5m

* 2-wheeler zone of size 5m x 2m can be demarcated to accommodate 5-6 two-wheelers or cycles.

4.8.3.2 Orientation and Manoeuvring Distances

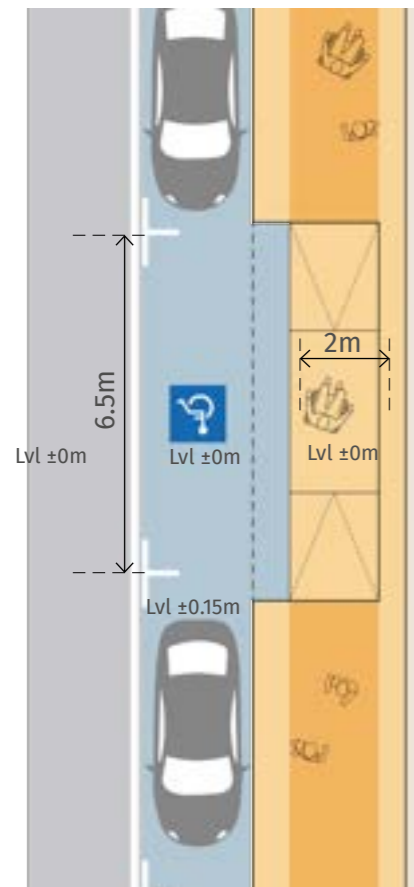


4.8.3.3 Parking Distances and Restrictions

Parking Rules	Buffer Dimension	Context
No Parking	Within 50m	From major junctions
	Within 15-20m	From minor junctions
	Within 30m in areas where 30m buffer is not feasible, it can be provided at 10m distance	From school entry/exit gates
	Within 50m	From mass transit hubs
	Within 20m	From bus stops
	Within 100m	From public off-street parking facility
	Property Entrances	
Parking Restrictions Parking shall be discouraged. In case of high demand, parking shall be optimised to minimum requirements.	On Arterial Roads and Bus Route Roads	
	Accommodating demand on local streets	
Parking Mandates	Within 75m	IPT parking - near transit hubs
	Every 100-150m of street	Cycle parking
	Every 500m of street length	Electric Charging Stations with 4W & 2W slots

*Refer IRC 70 for more details.

4.8.3.4 Accessible Parking Bay



It is recommended to provide wheelchair accessible parking spaces in off-street locations. On-street accessible parking space numbers should be provided in discussion with the local stakeholders, ensuring the continuity of walking zone.*

Where provided, on-street accessible parking bays must be clearly demarcated with signage and have access to ramps as shown in the figure.

*Refer IRC:SP:117 for more details.

4.8.3.5 EV Charging



It is recommended to provide charging points in off-street locations, ensuring the street space is used for short-term parking only.

In general, on-street charging point should be discouraged. However, in exceptional cases, wherever excess space in Street Element Corridor is available fast chargers can be accommodated abutting the on-street parking.

Iconic Road, Surat
Image Source - Streets Compendium, SCM

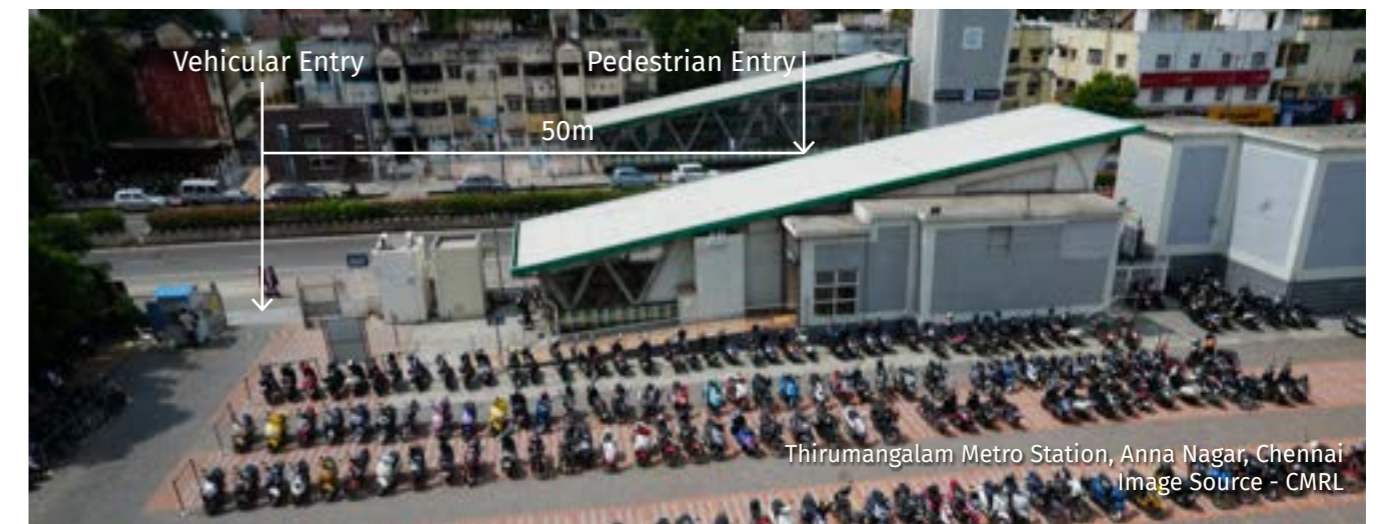
4.8.3.6 Park & Ride Facilities

Preferred Location

Place P&R entry/exit points on secondary or side streets rather than the main station access road. If located on the primary road, ensure they are positioned at least 30–50 m away from pedestrian entry/exit points.

Smooth Vehicular Circulation

Provide dedicated turning lanes or channelised access to prevent spillover onto the main carriageway. Avoid entries near junctions—maintain at least 50 m setback from intersections.



Thirumangalam Metro Station, Anna Nagar, Chennai
Image Source - CMRL

4.8.3.7 Parking Allocation in School Zone

Due to their small size, children tend to remain in the blind spot of vehicles (cars, trucks, SUVs, vans and buses), making them invisible users of streets. Parked vehicles obstruct the line of sight for both drivers and pedestrians, making it difficult for drivers to see children crossing the road and for children to see approaching vehicles. Hence, managing parking around schools is critical to ensure the safety of school children.

Location & Design



Any street with a school entry/exit shall not be designed with on-street parking for a distance of 30m on either side of the entry/exit, on both sides of the street.

In areas where 30m buffer is not feasible, on-street parking can be demarcated at a distance of 10m from the school entry / exit.

Parking for cycles, and school buses shall be provided within the school premises. If the school has space constraints, off-street parking facilities, in the vicinity of the school shall be identified.

- School
- School Zone
- - - 30m stretch around schools
- Streets where on-street parking is permissible



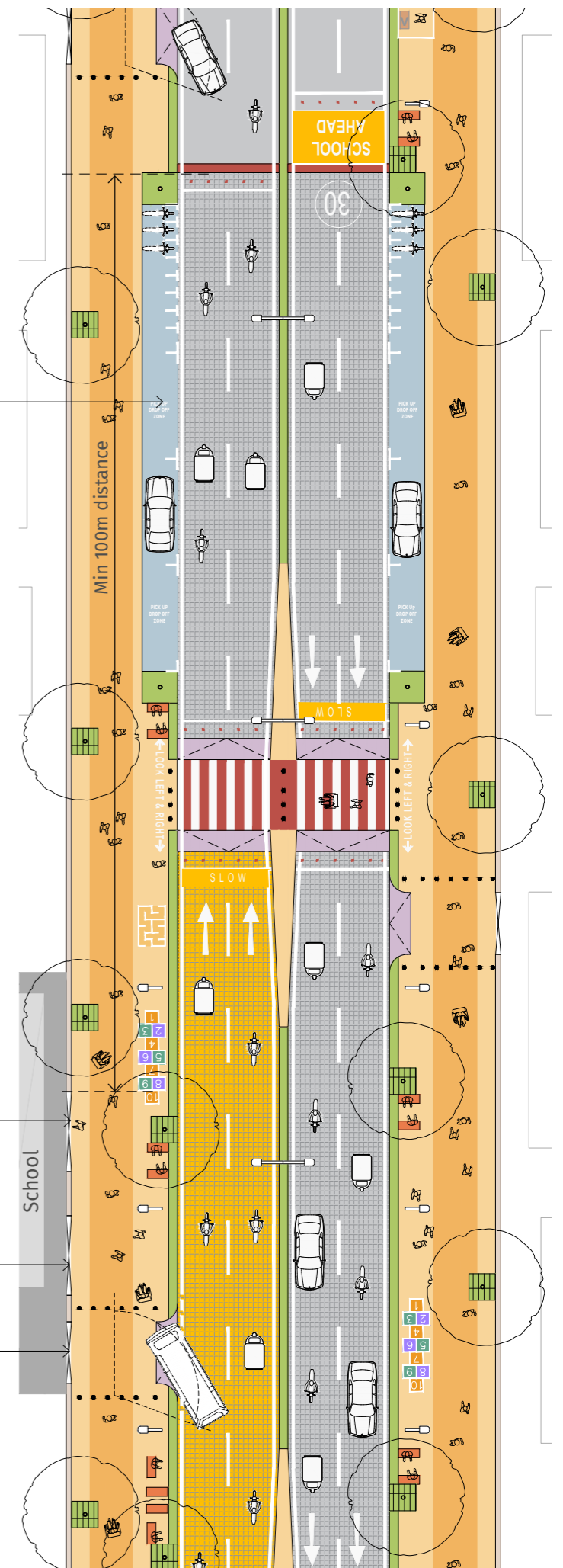
On-street parking on the streets within the School Zone shall follow the guidelines mentioned in Chapter 2.4

On-street Parking

Pedestrian Entry/Exit

Pedestrian Entry/Exit

Vehicular Entry/Exit

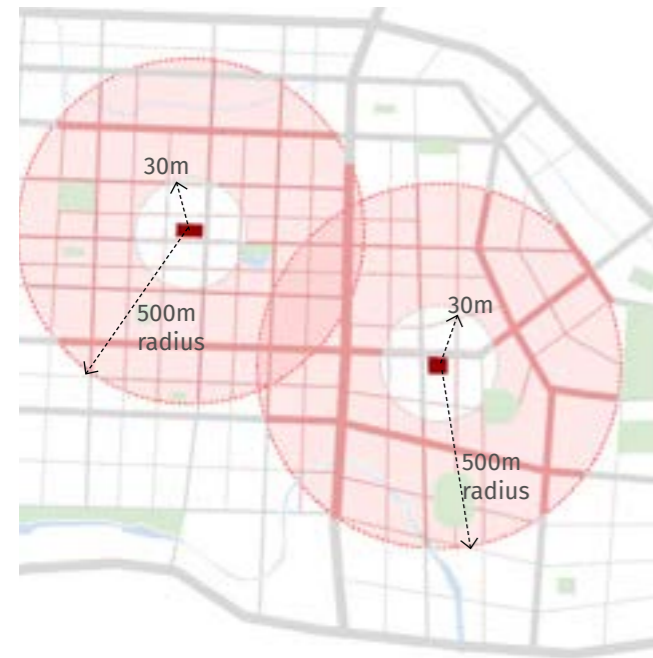


4.8.3.8 Pick-up and Drop-off Zones in School Zone

In India, though only 12% of school trips are made using private transport*, it causes significant congestion and chaotic parking around schools, further making school zones unsafe and polluted. A pick-up and drop-off zone is a space on the street, identified at a walkable distance that is dedicated to the loading and unloading of students by private motor vehicles or school buses. These are no-parking zones which facilitate temporary waiting of vehicles. Such zones provide a safe spot for children to be picked up or dropped at school.

* Household Social Consumption on Education in India, 2018, Ministry of Statistics and Programme Implementation

Location & Design



Pick-up and drop-off activities shall be accommodated at multiple locations in streets within the School Zone.

These streets can restrict vehicular access around school start and end times, and shall be designed with continuous and safe Footpath, as mentioned in Chapter 2.1.

Any street with a school entry/exit shall not permit pick-up / drop-off activities for a distance of 30m on either side of the entry/exit, on both sides of the street. In areas where 30m buffer is not feasible, pick-up / drop-off zones can be demarcated at a distance of 10m from the school entry / exit.

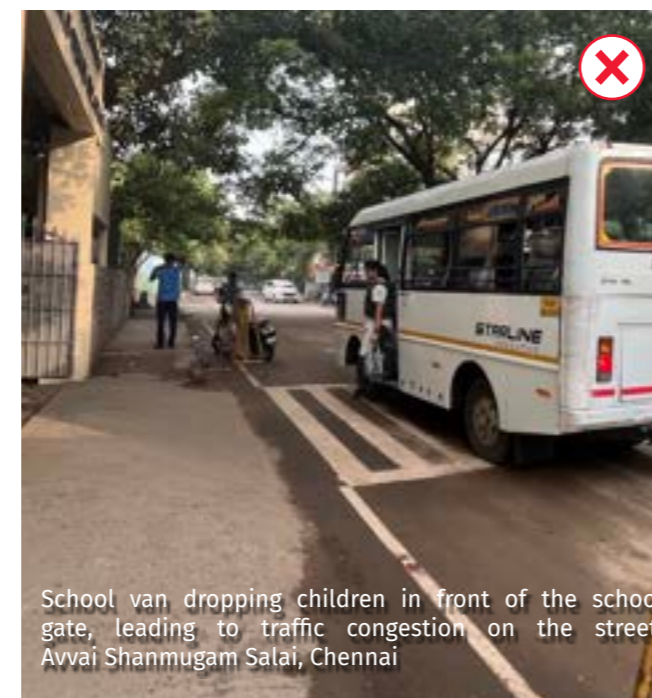
- School
- School Zone
- - - 30m stretch around schools
- Street stretch where pick-up / drop-off is permissible

Pick-up / drop-off for school buses and vans

School buses and vans carry a large volume of children. It is important to ensure these vehicles do not park on the carriageway for picking-up / dropping-off school children.

It is recommended that pick-up / drop-off for school buses/vans be provided within the school premises to ensure safe loading and unloading of children.

If the school has space constraints, off-street parking facilities, located within the School Zone may be identified for picking up and dropping off school children.



Pick-up / Drop-off for private vehicles

The pick-up / drop-off points for the private motor vehicles shall be accommodated in the on-street parking provisions, provided at a distance of 30m on either side of the entry/exit, on both sides of the street.

These provisions shall facilitate safe loading and unloading of students directly onto the footpath.

Except the pick-up / drop-off hours, these bays shall be used as public on-street parking facilities.

Parking bays shall be provided for a maximum of 30m along the school streets.

Pick-up / Drop-Off Zones

On-street pick-up / drop-off for school buses and vans

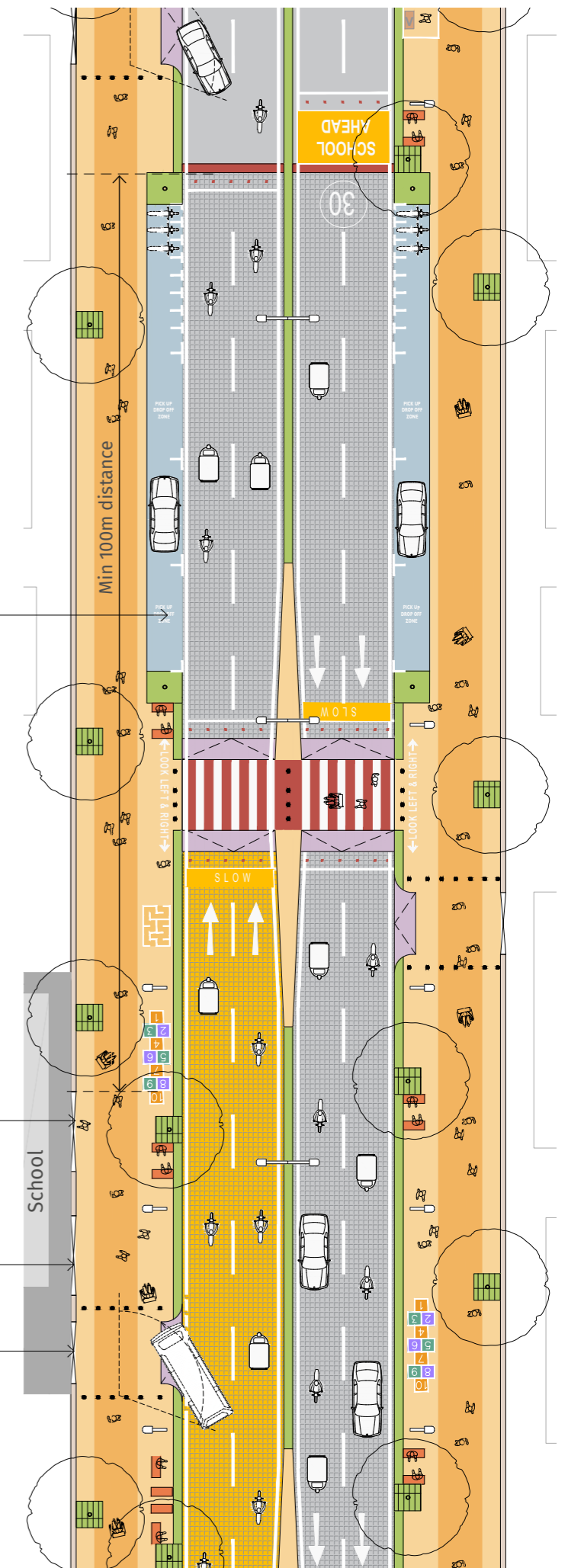
In cases where school buses and vans are unable to provide parking within the campus or identify off-street locations for pick-up / drop-off, the on-street parking facilities shall prioritize pick-up / drop-off for the school buses and vans.

School buses and van pick-up / drop off shall be provided on the same side of the street as the school to ensure less interaction between students and vehicles.

Pedestrian Entry/Exit

Pedestrian Entry/Exit

Vehicular Entry/Exit

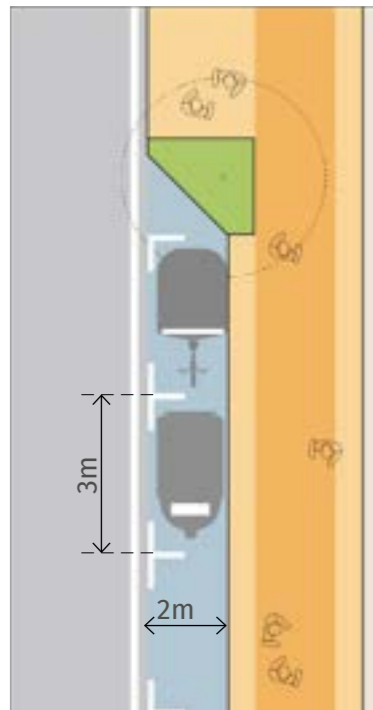


4.8.4 Auto/ IPT Bays

Above-ground electrical utilities—street lights, transformers, and electric poles—are integral to safe and functional streets. Their placement must ensure well-lit pathways, avoid obstructing footpaths, and maintain adequate clear zones for pedestrian movement. In street design, coordinating these utilities early in the layout helps prevent clutter, improves accessibility, and supports efficient maintenance while keeping the streetscape visually organised and safe.

4.8.4.1 Intermediate Public Transport (IPT)

IPT stands should preferably be located 50m before and after bus stops and 75m before and after other transit stations. All recommendations for location near intersections, bus stops remain same as for other on-street parking. IPT stands should also be located at places of high footfall - especially near hospitals and commercial areas.



Orientation

IPT stands should accommodate parallelly parked auto-rickshaws to ensure ease of manoeuvring and to occupy less space.

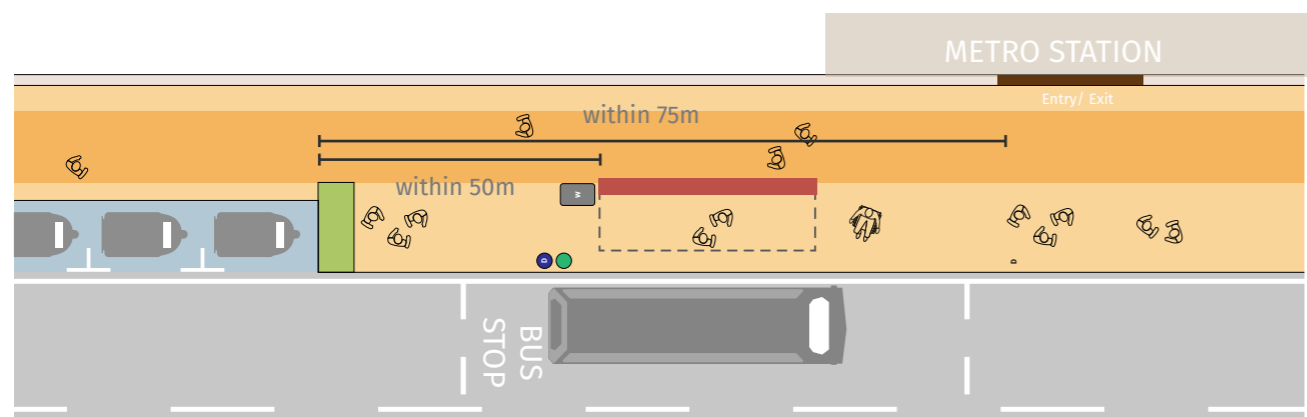
Clear signage for IPT markings highlighting the max capacity for autos should be provided.

A minimum of five and a maximum of eight parking spaces for IPT shall be provided in one parking zone.

Kerb Edge

The kerb edge shall be positioned at a 45-degree angle to accommodate sufficient space of manoeuvring.

Integration with Public Transport Modes

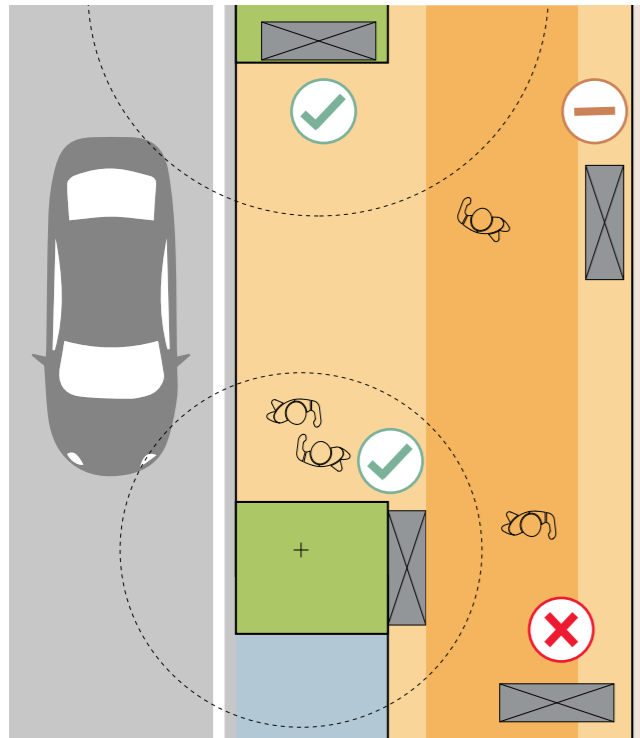


Alandur Metro Station - IPT Integration
Image Source: CMRL

4.8.5 Electrical - Above Ground

Above-ground electrical utilities—transformers, and electric poles—are integral to safe and functional streets. Their placement must ensure well-lit pathways, avoid obstructing footpaths, and maintain adequate clear zones for pedestrian movement. In street design, coordinating these utilities early in the layout helps prevent clutter, improves accessibility, and supports efficient maintenance while keeping the streetscape visually organised and safe.

4.8.5.1 Electrical - Utility Boxes and Transformer



Utility Boxes

Utility boxes should be located in the frontage or SEC, where available. They should be placed ensuring that there is no physical and visual obstruction in the walking zone and along street edges.

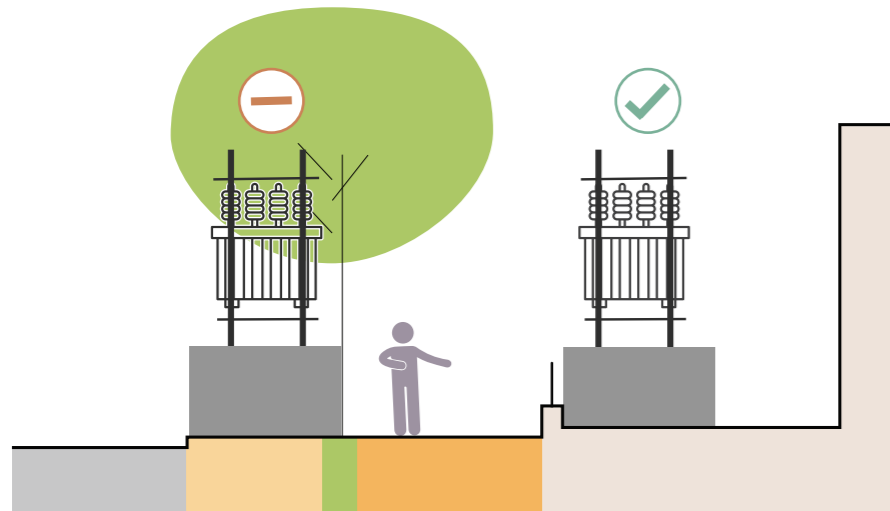
Adequate planning is necessary to ensure utility boxes do not disrupt the flow of pedestrian movement.

Utility boxes shall not constrain the width of a cycle track.

Transformer

Transformers must not be placed within the clear pedestrian zone. They should be positioned in the frontage zone or Street Elements Corridor (SEC), where available, to avoid physical and visual obstructions. Placement should ensure that sightlines at junctions, building entrances, and crossings remain clear, and the pedestrian flow is not disrupted.

Wherever feasible, transformers should be located off-street—within public spaces, OSR (Open Space Reservation) land. **Subject to project cost and feasibility, traditional bulky transformers should be replaced with compact, modern, low-footprint units to reduce obstruction and improve overall efficiency.**



Transformer with metal box enclosure, Pondy Bazaar, Chennai

4.8.5.2 Electrical - Electrical Pole

Electrical Pole

Location

Place poles only in the frontage or SEC, ensuring they do not encroach into the 2 m clear pedestrian zone.

Dimensions & Clearances

Maintain a 0.5–0.75 m offset from the footpath edge and ensure 3.0 m vertical clearance over footpaths and 5.5 m over carriageways.

Pole Height & Spacing

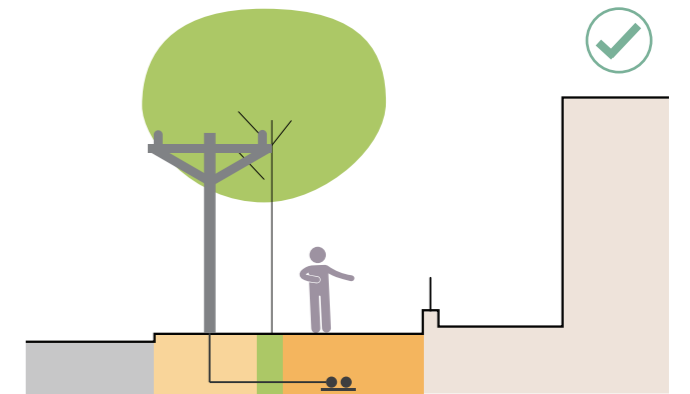
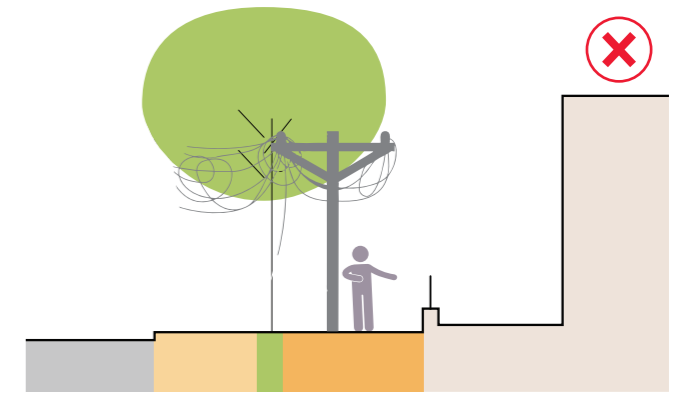
Use 7–10 m poles spaced 30–50 m apart based on lighting and utility needs.

Overhead Wires

Ensure wires maintain required safety clearances and do not sag or obstruct movement along the street edge.

Modernisation Note

Where feasible, replace overhead networks with underground cabling or compact utility poles to reduce visual and physical clutter.



4.8.5.3 Camera and Signal Controller

Camera Poles:

Camera poles must be installed within the Street Elements Corridor (SEC) or median based on requirement. Install CCTV/ APNR cameras at a height of 6–8 m on lighting or utility poles, with clear sight lines covering junctions, crossings, and high-activity zones, ensuring they do not obstruct the pedestrian clear path.

Local Processing Units (LPU):

One LPU is required for every three cameras and should be placed within the SEC. Where SEC space is not available, the LPU may be placed at the kerb edge but must not obstruct the clear pedestrian walkway.

Network Video Recorder (NVR) & UPS Cabinet:

NVR units and accompanying UPS cabinets must only be located within the SEC zone, ensuring they do not interfere with walking paths or utilities.

Signal Controller & NVR Placement

Signal controllers, along with NVR and UPS cabinets, should be installed near junctions within the SEC. Their placement must not obstruct the clear pedestrian walkway, maintain adequate sightlines, and avoid creating any visual hindrance in the streetscape.



Ambal Nagar, Chennai

All cameras must be connected to a reliable electrical power source, and their output feeds should be routed to the Police ICCC through dedicated telecom ducts integrated within the utility corridor.

Other Public Amenities

Public amenities such as dustbins, toilets, drinking water kiosks, police booths, and PBS stations are essential for making streets functional and people-friendly. When integrated seamlessly into the Street Elements Corridor, they support comfort, safety, hygiene, and sustainable mobility—without obstructing the pedestrian zone. Thoughtful placement, compact designs, and coordination with utilities ensure these elements blend into the streetscape, enhancing walkability and overall street experience.

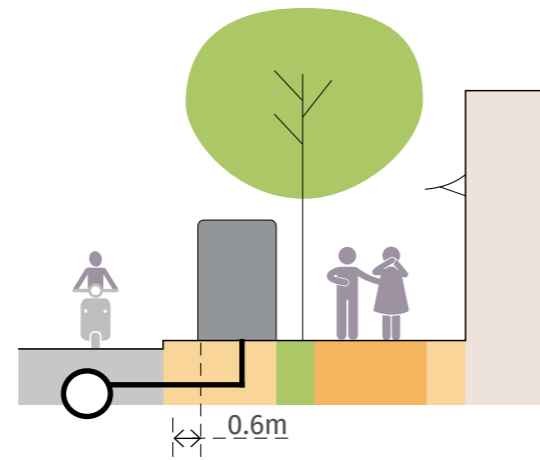
4.8.6 Public Toilets

Public Toilets

It is recommended that public toilets should be provided in off-street locations, ensuring accessibility and safety for all users.

However, if it is provided as on-street, it should be placed at a minimum of 0.6m clear distance from the kerb edge with a minimum of 2m clear walking zone in front of it. Regular maintenance should be done to ensure clean environment.

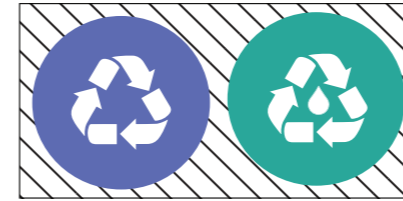
*Refer IRC:SP:117 for detailed design.



Paris, France

4.8.7 Garbage Bins

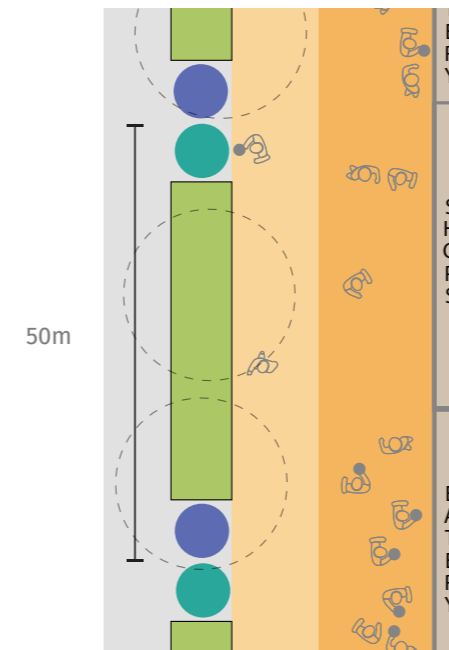
1.5 sq.m



Size

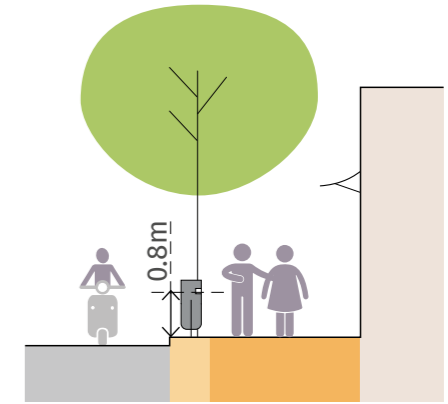
Separate bins should be provided for wet and recyclable waste in Street Element Corridor; total space allocated should not exceed 1.5 sq.m., at a preferable frequency of 50-75m.

All Commercial, Eatery and Hotels should have their own garbage bins and should not place them on the street/ footpath. The waste has to be handed over to the waste collection team of ULB.

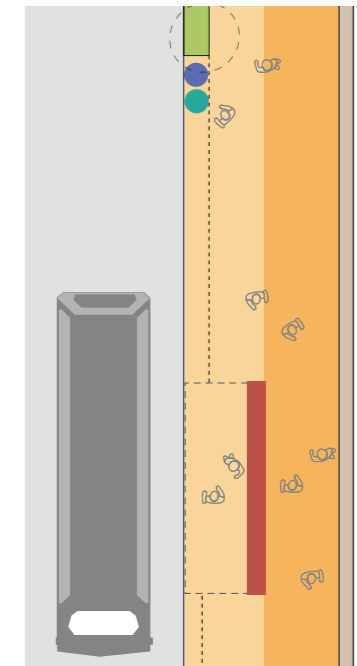


Adjacent Activity

Dustbins should be provided at regular intervals according to adjacent land uses and activity.



Opening of the bins should preferably be at a height of 0.8m from the finished floor level.



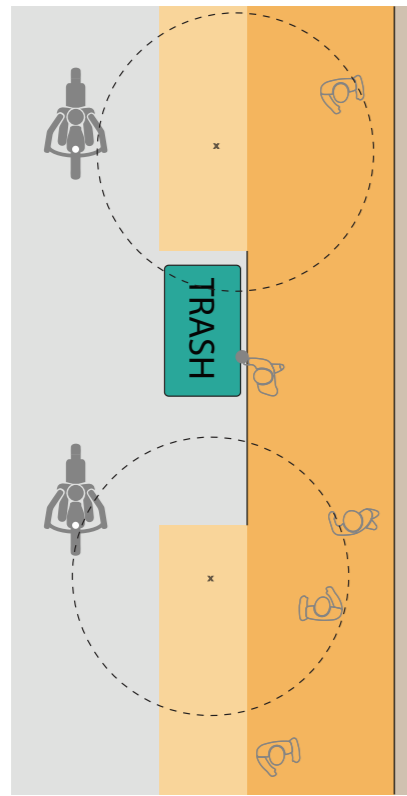
Location

Dustbins should be placed near all transit stations, parking and vending areas owing to the high people activity expected there.



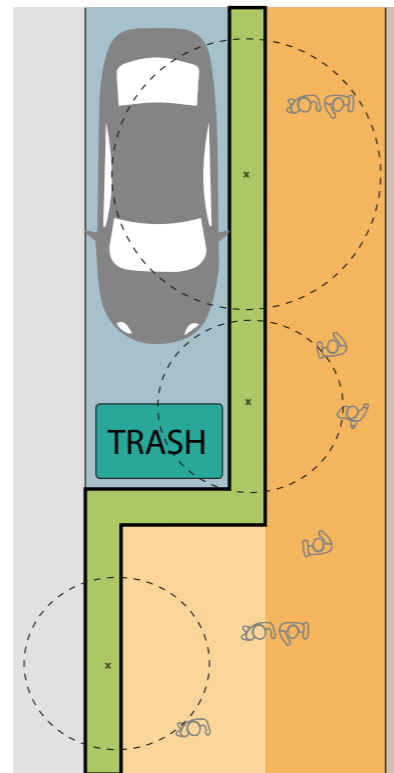
CG Road, Ahmedabad

Dumpster Bins



Niches

Garbage containers should be placed in niches (1 m x 3 m per container) in the multi-utility zone for easy lifting.



In parking bays

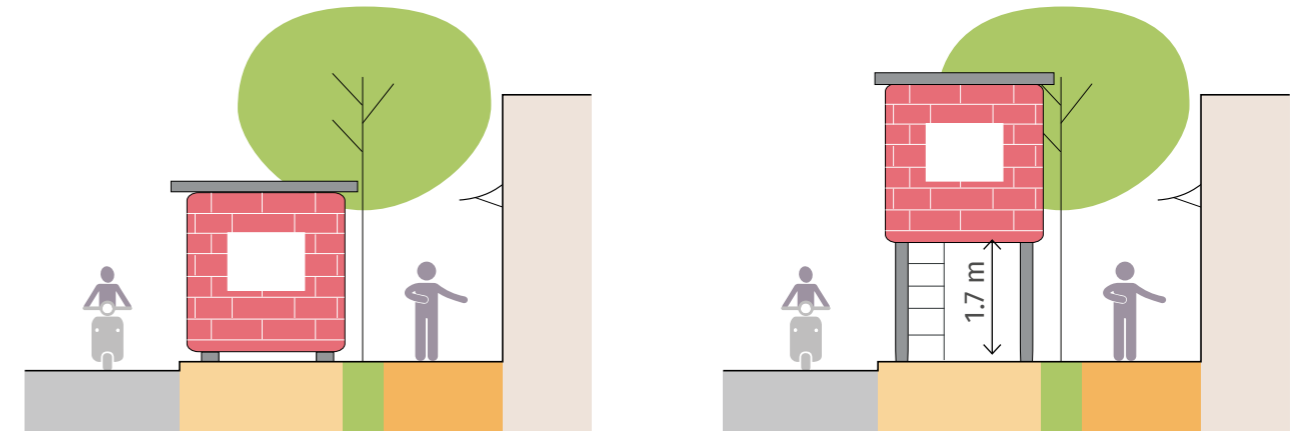
Garbage containers can also be placed within parking bays.



Harrington Road, Chennai

4.8.8 Police Booth

Locate police booths at key junctions or high-footfall areas, ideally located on Street Elements Corridor. The booth can also be designed with stilt with a clear height of 1.7m.

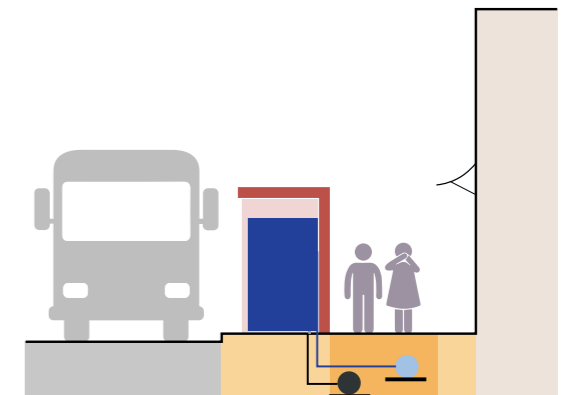


4.8.9 Drinking Water Kiosk

A drinking water stand-alone unit, typically 0.6–1.0 m wide with a shallow depth of 0.4–0.6 m, integrated within the Street Elements Corridor (SEC).

It should be placed near bus stops, parks, playgrounds, markets, or other high-footfall public spaces, ensuring the 2 m clear pedestrian zone remains unobstructed.

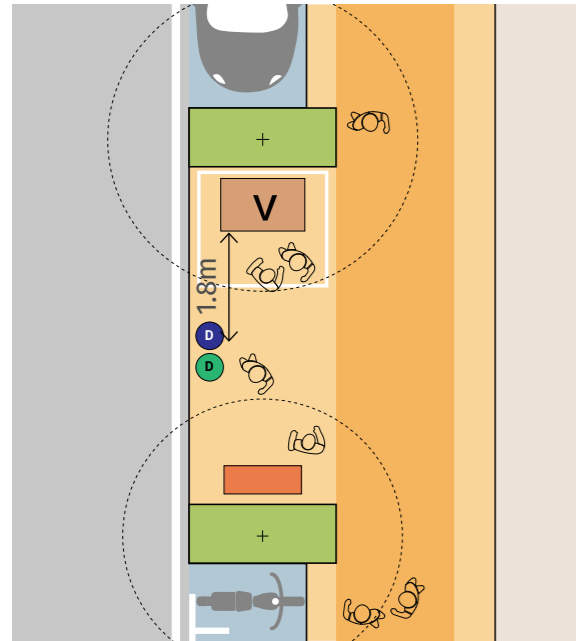
The facility must have a direct piped water connection, drainage, and power supply for a small in-line RO or filtration system.



Water ATM, KK Nagar

4.8.10 Street Vending

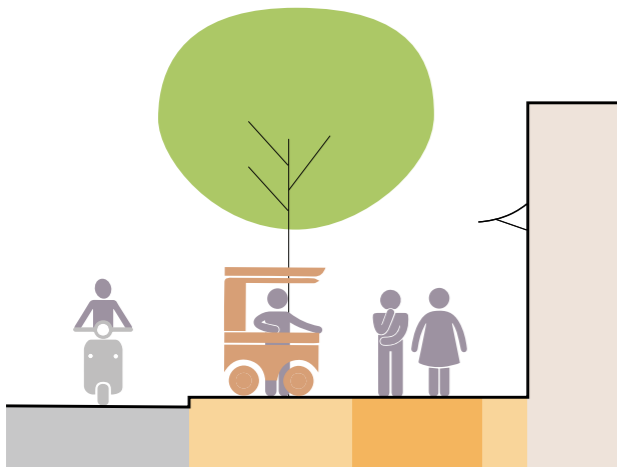
Street vending provides for an important social space and serves as a form of security for those walking on the street, especially women. The National Street Vendors Act, 2014 makes it mandatory to accommodate vending areas in street design, ensuring provisions for spillover. A spatial plan for street vending can be formulated, contributing to enhanced personal security through the presence of street vendors.³



Design

A typical vendor space of 1.8m x 1.8m (including spillover space) should be clearly demarcated in the SEC.

Public amenities like water taps, electricity points, and dustbins should be provided accordingly.³



Location

Street vending activity should be located in the SEC to avoid any obstruction in the walking zone.

Demarcated vending spaces should be provided where there is an existing demand, especially near high footfall zones.



Vendor obstructs the walking zone in K K Nagar, Chennai

A Vending Management Plan, informed by periodic surveys, certification of vendors, and designation of special vending and no-vending zones in the city, shall be prepared. These shall be created as a series of local area plans. This is primarily because vendors already exist and cannot be displaced too far off from their current locations, and different streets in a region will have different capacities for vending zones. This can be assessed only at the neighbourhood level.



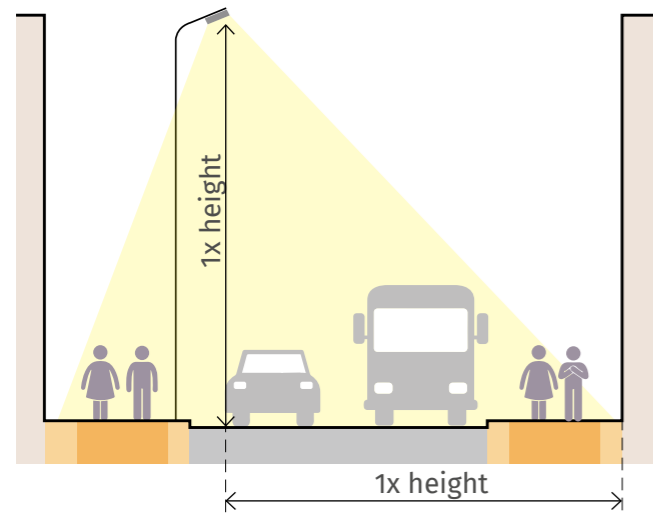
A clear wide footpath with vendors in SEC in Smart Janpath, Bhubaneswar
Image Source - Elements Creative India



4.9 Street Furniture

4.9.1 Street Lights

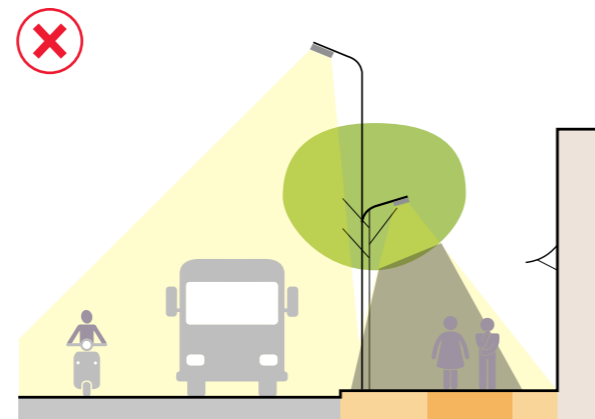
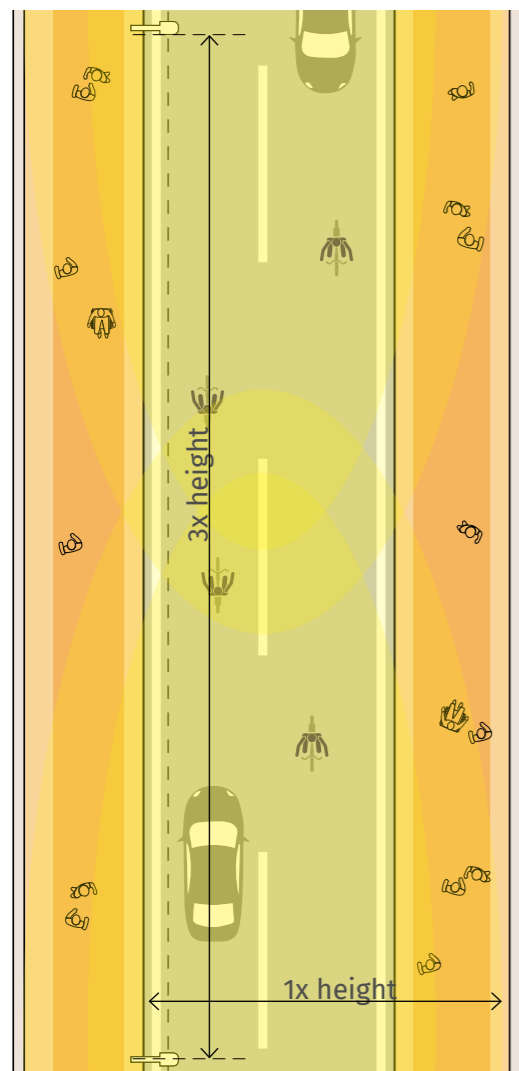
Street lighting is a critical element of street design that ensures safety, accessibility, and comfort after dark. Well-designed lighting improves visibility for all road users, reduces crashes, enhances personal security—especially for women and vulnerable users—and supports social and economic activity by extending the usable hours of streets. Beyond functionality, good street lighting also improves the overall quality and inclusiveness of public spaces.



Light Fixtures

LED light fixtures are recommended for low energy consumption. Warm white LED light is preferred. 25-30 lux levels of lighting should be available on the footpath as per IRC 103.

Street lights should be placed in a way to illuminate the street surface, minimising glare and light pollution.



Landscape & Lighting

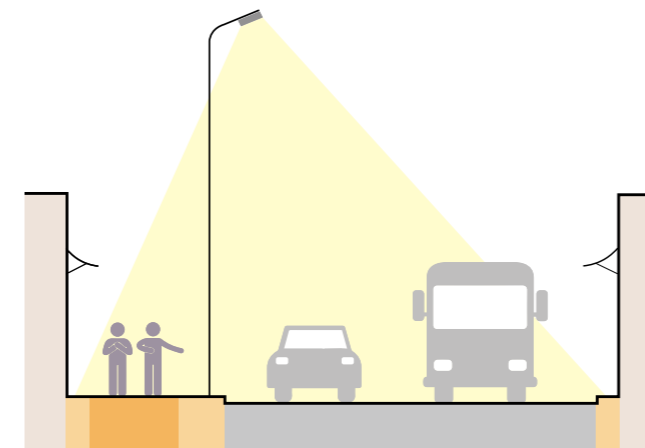
An integrated plan of street lights and trees should be prepared to avoid any obstruction to street light.

Height

Light poles should be no higher than 12m so as to avoid undesirable illumination of private properties.

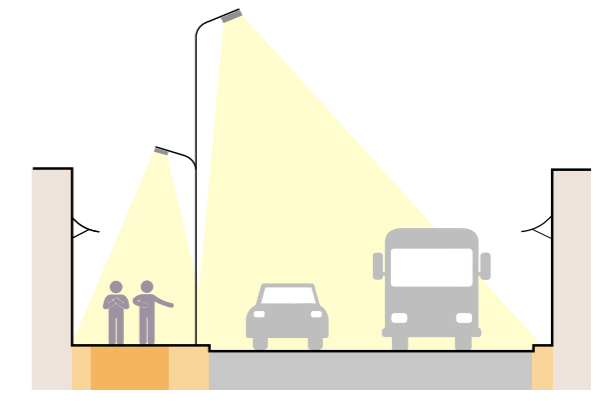
Spacing

Spacing between two light poles should be about 3 times the height of the fixtures to ensure full coverage.



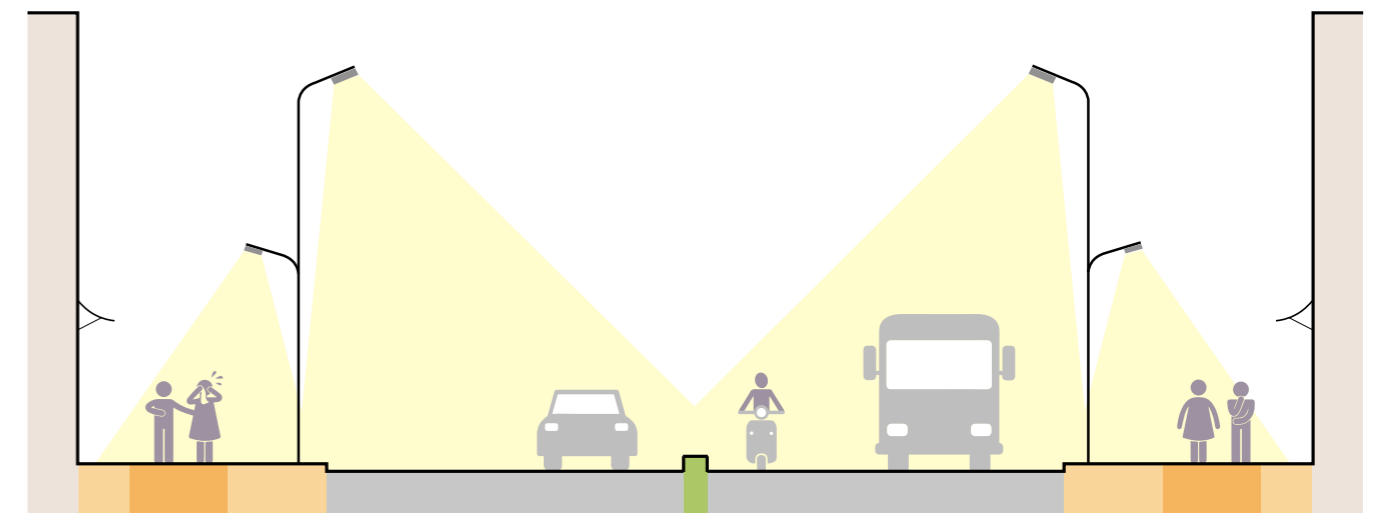
Placement on RoW ≤ 12m

A single light in the SEC can be used if it illuminates the entire RoW.



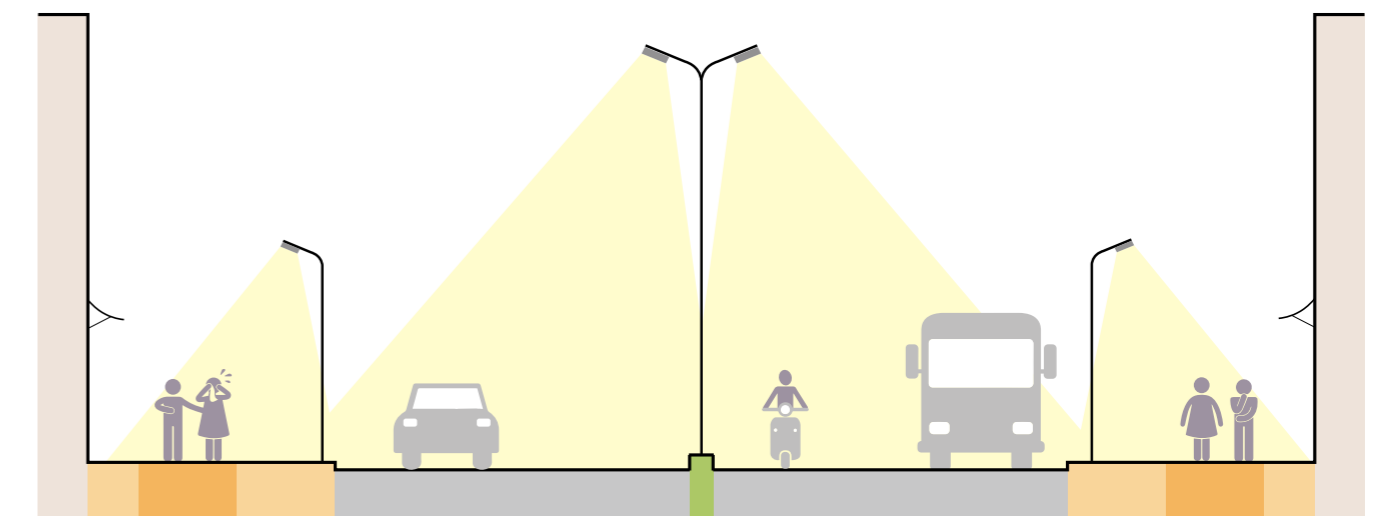
Placement on RoW ≤ 12m

Else, a pedestrian light should be fixed at a lower level to illuminate the entire edge.



Placement on wide streets

Pedestrian and street lights can be combined in a single pole in the SEC to avoid clutter, provided there is proper illumination.



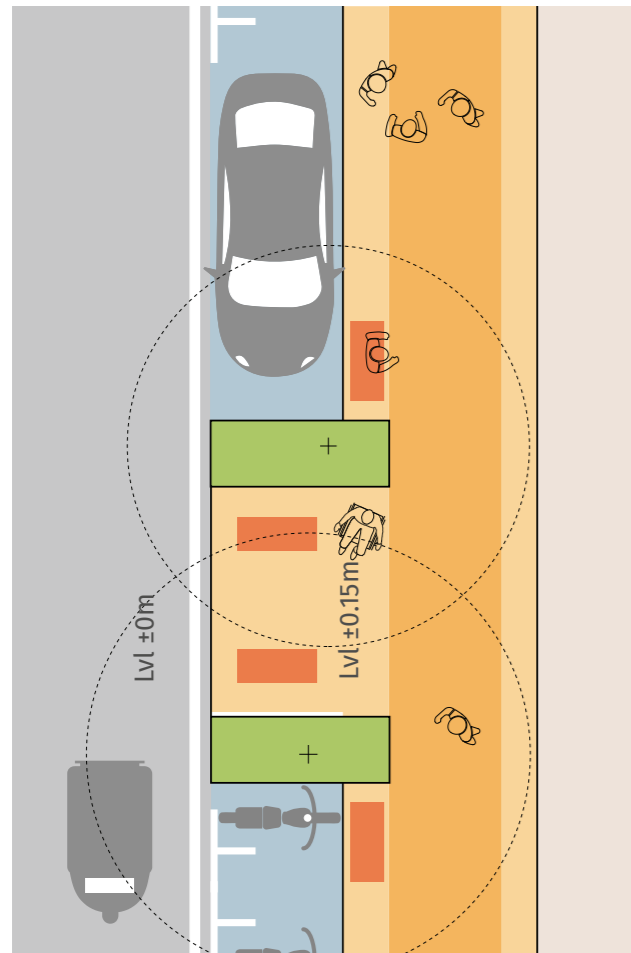
Median poles can be used for the carriageway and pedestrian lights should be provided separately.

*These guidelines are generic recommendations. A lighting consultant may be engaged to contextualise these, determine the necessary lux levels, and develop detailed designs.

4.9.2 Seating

Seating is an essential element of inclusive street design, providing rest points for all users—especially the elderly, children, caregivers, and people with disabilities. Well-placed seater enhance comfort, encourage longer stays, support social interaction, and make streets more welcoming and walkable. Integrating seating at regular intervals, particularly near transit stops, crossings, parks, and commercial areas, improves overall public realm usability and promotes active mobility.

4.9.2.1 Seating



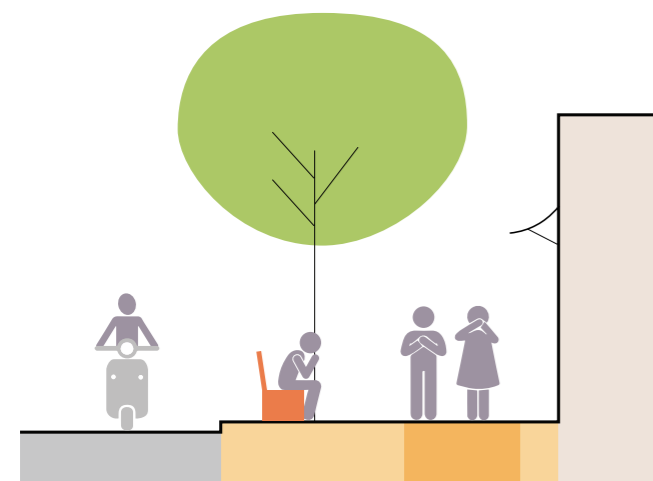
Orientation

Streets with wide SEC (>1.5m) can have a group seating layout perpendicular to the direction of pedestrian movement.

Streets with narrow SEC (<1.5m) can have a linear seating layout along the direction of pedestrian movement.

Design

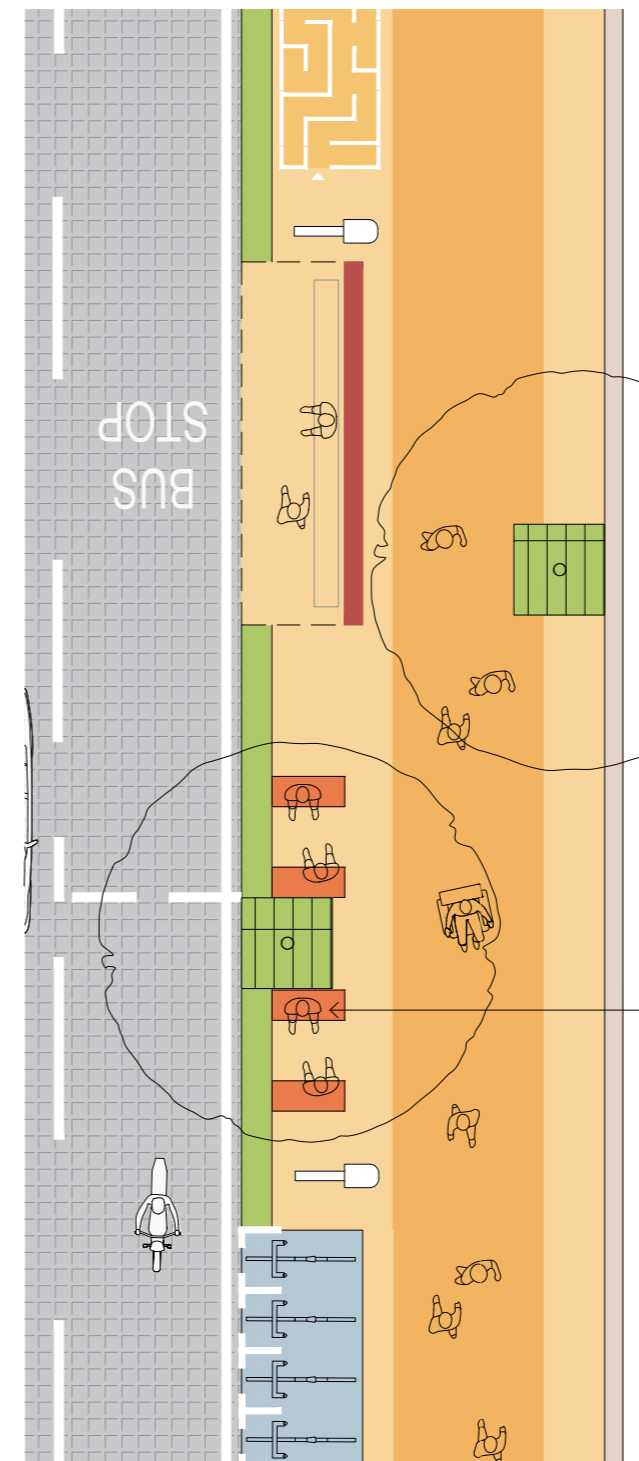
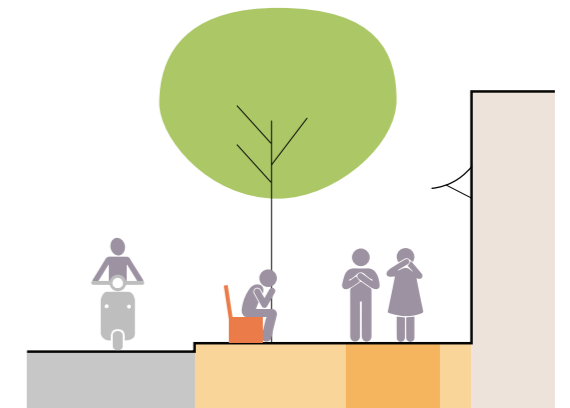
Seats may have backrest and armrest. Height and depth of seats should be 450mm (excluding backrest). They should be well shaded either natural or built.



Seating in School Zones

To ensure comfortable and accessible seating for children, the height of seating along the streets in School Zones shall be 0.5m. These must be located in the SEC to avoid obstruction in the walking zone.

To facilitate frequent pause and rest spaces for children, seating must be provided every 50–100m along streets within the School Zone.



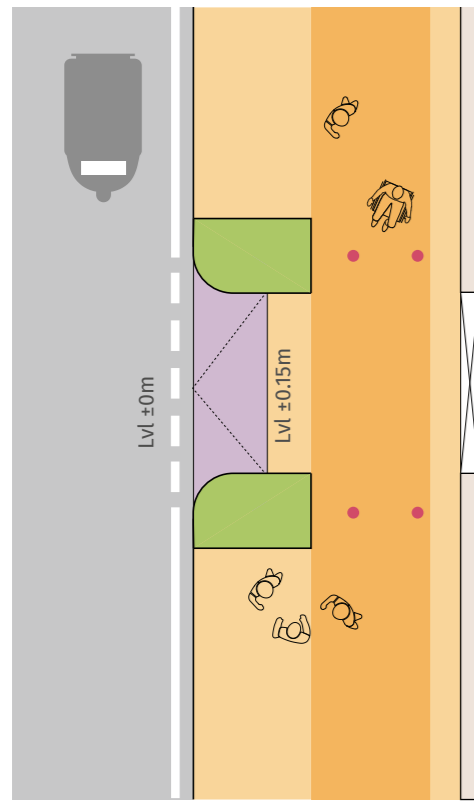
Seating clusters along the streets must be designed near transit stops, play areas, and street corners within the School Zone and must include space for caregivers, wheelchairs and strollers.

Seating must be designed with different forms, shape and colour to invite children for play and must be well-shaded.

Seating clusters

4.9.3 Bollards

Bollards are essential for defining pedestrian-only spaces, protecting footpaths from illegal parking and encroachment, and enhancing safety near crossings, school zones, transit hubs, and high-footfall areas. They guide vehicle movement, reinforce traffic-calming measures, and help maintain clear, unobstructed walking zones. Properly spaced, high-visibility bollards improve streetscape organisation while ensuring pedestrian comfort and safety.



Location

Bollards should be provided at locations where vehicle encroachment is possible, such as property entrances, pedestrian median refuge, and table-top crossings.

Height

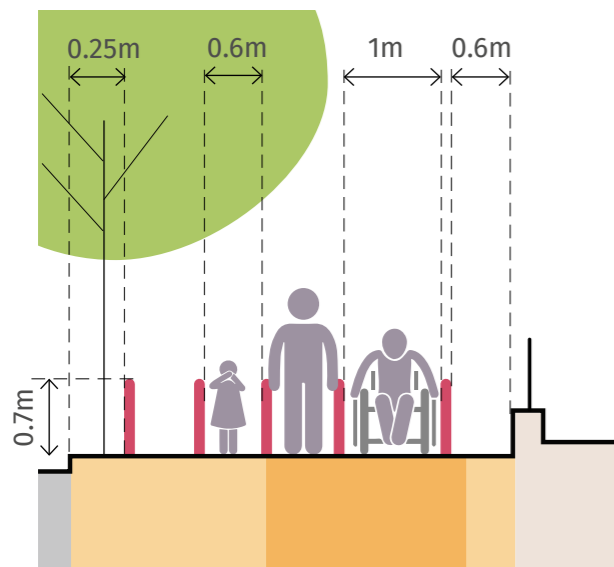
Bollard height should be minimum 0.7m for footpaths.

Spacing

Clear width for footpaths should be 0.6m; 1m for wheelchair access should be provided near the building edge as per IRC 103:2022. Bollard outer edge should be placed 0.25m away from the footpath kerb edge and 0.6m away from the building edge/boundary to ensure proper fixing.

Reflective tapes

Bollards with minimum 1000 mm height should be identifiable by using contrasting colours with the provision of reflective tapes as per IRC:103.



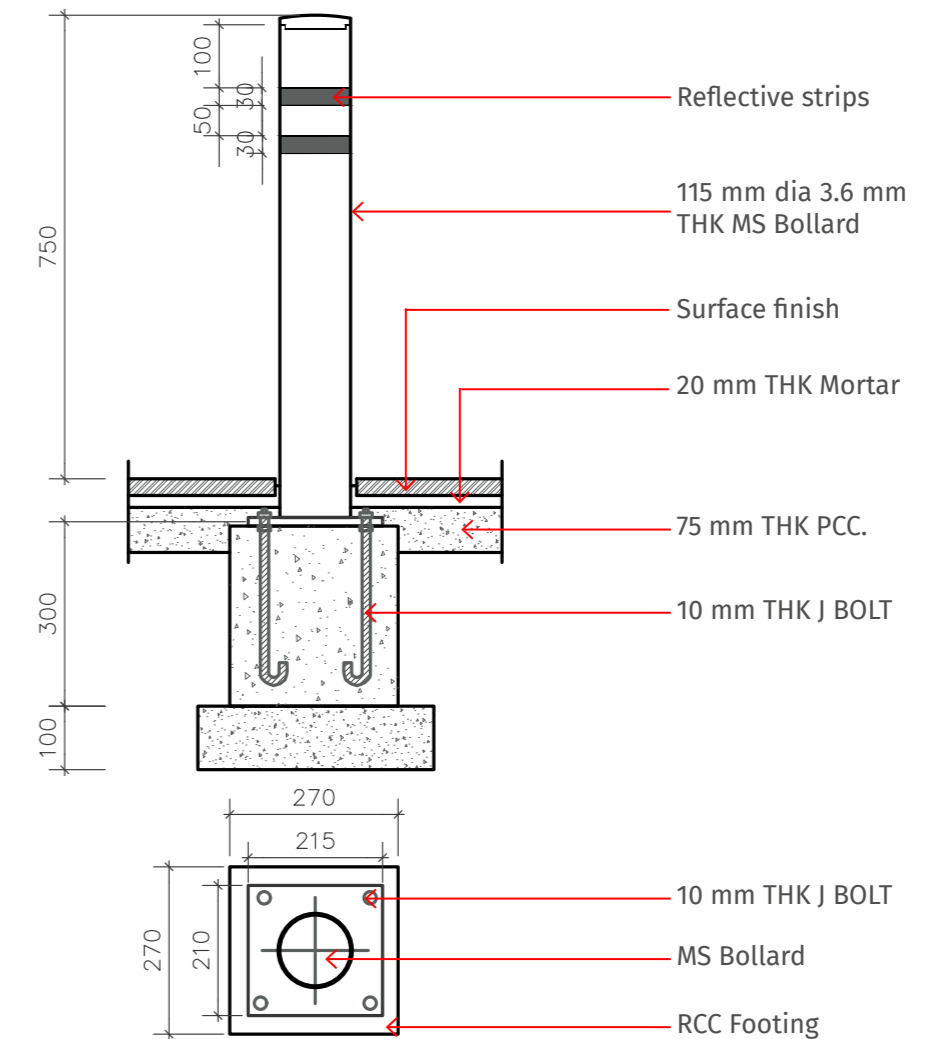
Reflective tapes

Bollards with minimum 1000 mm high should be identifiable by using contrasting colours with the provision of reflective tapes as per IRC:103.



Reflective tapes on bollards at Binny road, Chennai

Cross section of a bollard



Steps involved in the construction of bollards

4.9.4 Railings

Railings help channel pedestrian movement at high-conflict zones—such as near schools, transit hubs, and busy intersections—by preventing unsafe mid-block crossings and guiding people toward designated crossing points. They enhance safety at curves or locations with poor visibility and offer edge protection along drains or level differences. Railings should be used sparingly, placed only where essential, and designed to be transparent, unobtrusive, and consistent with the streetscape.

Location

Railings should be avoided on streets, as it obstructs access on and off the footpath. This obstruction can impede pedestrian movement and compromise safety by limiting the ease of entry and exit.

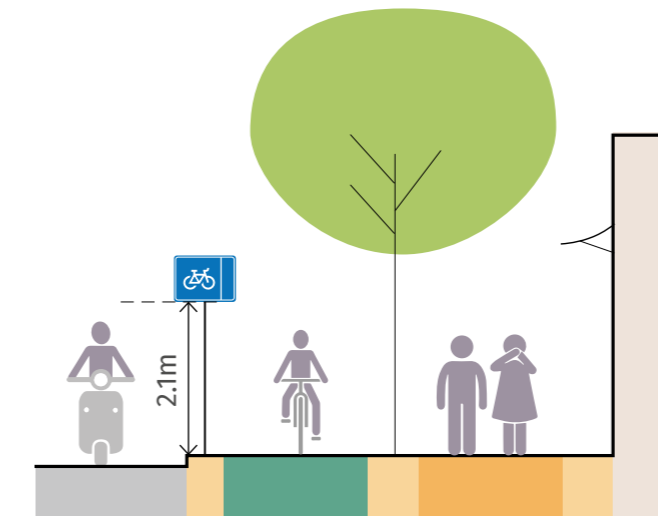
Placement

Railings may be provided near schools, it should be located 0.25m away from the footpath edge and should have a height of 0.7m. This safety measure helps protect pedestrians, especially children, by preventing accidental falls onto the road.



4.9.5 Pedestrian and Cyclist Signage

Pedestrian and cyclist signage plays a key role in improving safety, wayfinding, and ease of movement on streets. Clear, visible, and well-placed signs help users navigate routes, identify crossings, cycle tracks, and destinations, and understand right-of-way, especially at junctions and conflict points. Consistent signage supports inclusive street use, reduces confusion for all users, and encourages walking and cycling by making streets more legible and comfortable.

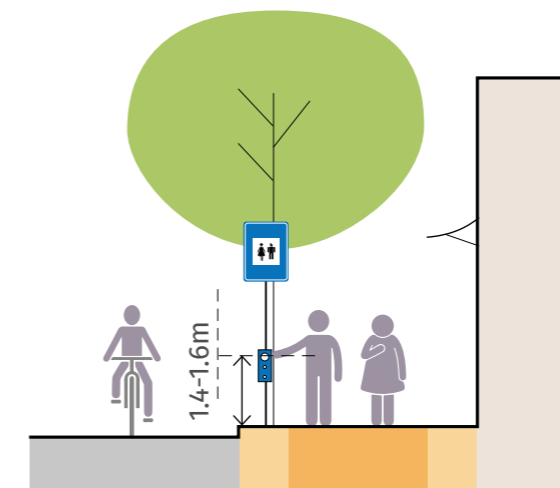


Location

Signage should be located at 0.25m from the kerb edge with minimum 2.1 m vertical clearance from the finished footpath level to the bottom of the signage board.

Multiple informatory signs can be combined on a single pole to reduce clutter.

All signage shall adhere to the specifications mentioned in IRC: 67 - 2021



Braille Signage

Braille sign boards* should be located between 1.4-1.6m from finished footpath level.

*For signage design details, please refer to IRC:SP:117



Orientation

Signage should be placed perpendicular to the line of traffic, on the left side of the road with clear visibility.

4.9.6 Play Spaces and Public Art Installations

Streets hold immense potential as more than just passageways. Streets, especially around schools, can become spaces that foster inspiration, learning, and most importantly nurture play for children—a crucial aspect of their growth that promotes physical activity, motor skills, socialization, and creativity. It is important that these streets are carefully designed to nurture these qualities in children.

4.9.6.1 Play spaces



Play equipment and play spaces shall be located in the SEC or in the Frontage zone depending on the availability of space, context and factoring in the safety of children. If located in the SEC closer to the kerb, a landscape buffer shall be provided.



These shall be located under well-shaded spaces with sufficient seating around. The play space must be programmed at regular intervals to ensure it does not lead to overcrowding of children in one location.



JM Road, Pune



Interactive play elements painted along school routes as part of a tactical trial, Dehradun
Image Source: Dehradun Smart City

Footpath and abutting compound walls shall be designed with interactive murals, puzzles, games and other artwork to make the space vibrant and fun for children.

Brighter colours and fun patterns can be incorporated with traffic calming measures. The design shall be such that children are not encouraged to stop on the streets and the colours are not distracting to the drivers.



Murals along the compound walls of properties leading up to the school, Surat
Image Source: The Urban Lab Foundation

4.9.6.2 Public Art

Location

Recommended to be placed at public plazas, landmark junctions, wider ROW streets, and iconic corridors in SEC

Design & Integration

Use durable, low-maintenance, context-sensitive artworks that do not protrude into pedestrian movement or disrupt sight lines.

Safety

Ensure installations pose no trip hazards or visibility obstructions.

Community Engagement

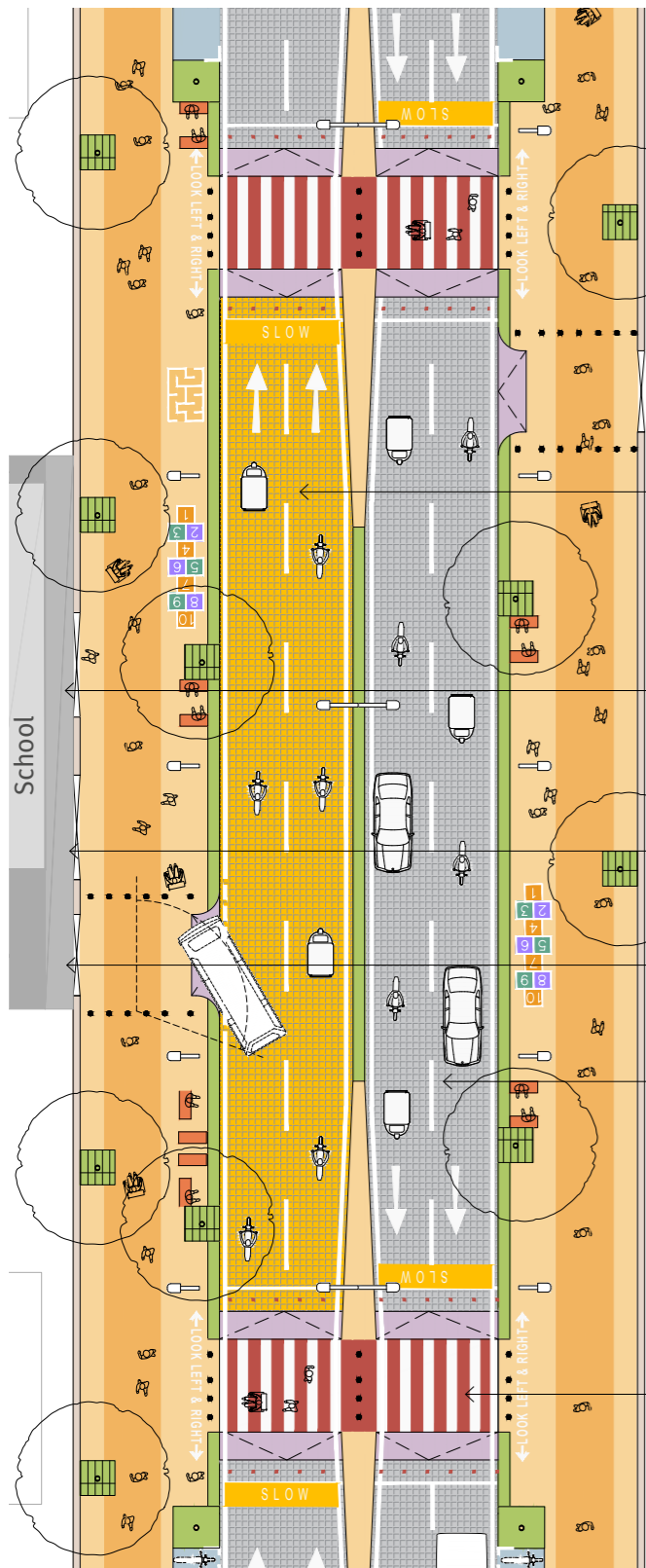
Involve local artists and community groups to create context-relevant, inclusive art.



Besant Nagar 3rd venue, Chennai

4.9.7 School Entry and Exit

School entries and exits are the areas that become congested and chaotic, especially around school start and end times. These pose a significant safety risk if not designed correctly. These entries and exits should aim for zero vehicle-pedestrian conflicts, and should prioritize safe movement of children in and out of the school premises.



Schools shall provide separate entries and exits for pedestrian and vehicular access.

It is recommended that, wherever feasible, schools be designed with multiple entry / exit points, to reduce conflicts between different street users. This enables chanelising vehicular and pedestrian traffic in and around School Zones more effectively.

It is recommended that be school entries and exits be placed on collector and local streets than the arterial streets, if the plot allows for it.

Delineating School Property

It is recommended that the carriageway be painted yellow, where the school property starts and ends. This helps draws the attention of motorists by making children more visible.

Pedestrian Entry/Exit

Pedestrian Entry/Exit

Vehicular Entry/Exit

Textured Surface for Traffic Calming

To ensure safer speeds around school entries and exits, materials like cobble-stone, paver blocks, or rumble strips can be provided on the carriageway, 100 m on either side of the school entry / exit gate.

IRC: 32 specifies the 100m length as the School Access Zone

Speed table / Table-top crossing

To facilitate easy crossing and clear demarcation of pick-up/drop-off zones around schools, speed table / table-top crossings shall be provided at a distance of 30m on either side of the entry/exit, on both sides of the street.



Lack of continuous and wide Footpath in front of the school entry/exit, Avvai Shanmugam Salai, Chennai

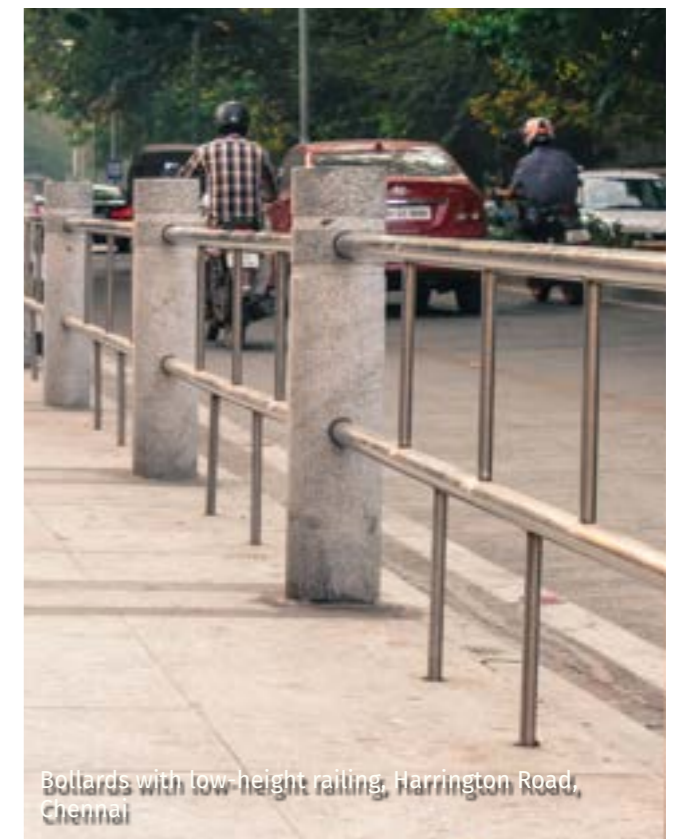


School street designed with wide, multiple entries/exits and with continuous Footpath, Sir Thyagaraya road, Chennai

Pick-up/drop-off activities shall not be permissible in front of the school entry/exit. This is to ensure that overcrowding of children near the entry/exit does not happen, ensuring lesser conflict with the traffic.

Bollards with chains or low height railing shall be provided on either side of the school entry / exit for up to 30m distance.

In areas where 30m buffer is not feasible, the bollards can be provided up to a distance of 10m from the school entry / exit.



Bollards with low-height railing, Harrington Road, Chennai



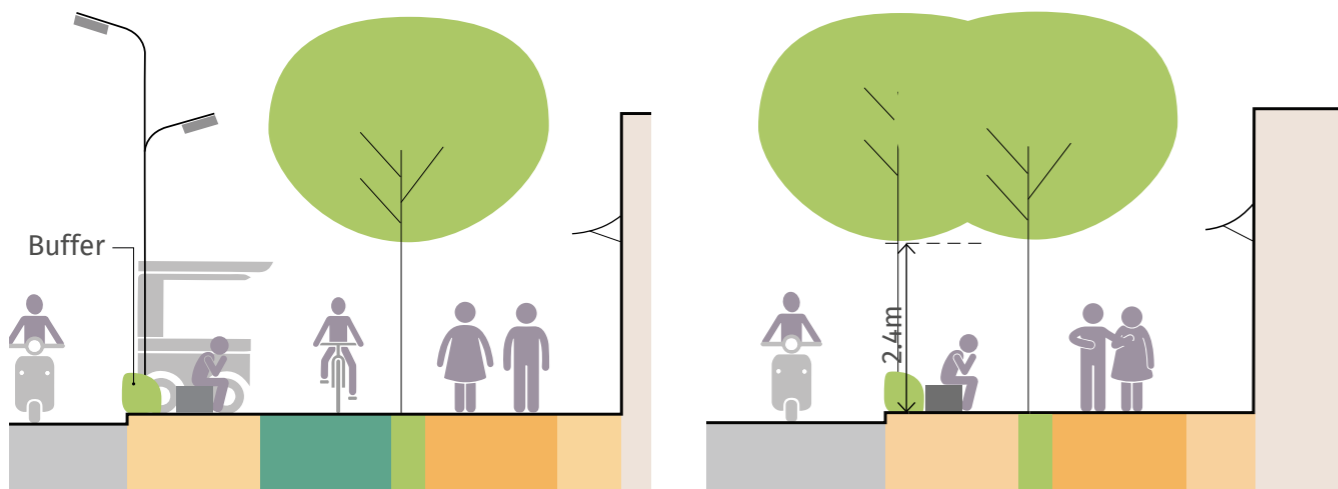
4.10 Green and Landscape Strategy

4.10 Tree Corridor and Tree Pits

Landscape enhances user comfort through shade, improves street aesthetics, and supports sustainable drainage by directing storm water into tree pits and planted areas. Shrubs should be used only where sufficient walking space is available. Existing trees must be preserved, and new species selected based on local climate. Street lights, signage, and trees should be coordinated to avoid blocking lighting or wayfinding. Consult horticulture experts for context-appropriate detailing. Refer IRC: SP 119, IRC: SP 50, and IRC: SP 42 for additional guidance.



4.10.1 Location & Vertical Clearance



Tree Corridor (1m for Small Canopy Trees and 1.5m for Large Canopy Trees)

Landscape elements should be placed in the tree corridor and in SEC where utility is not an obstruction, to serve shade for walking, cycling, seating, vending, and other activities.

Trees and low-height shrubs can be used as a buffer between various modes of transport.

Vertical Clearance

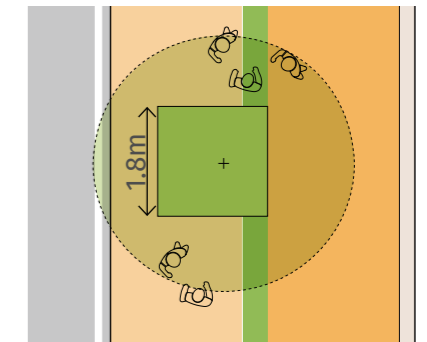
Vertical clearance of 2.4m from the finished footpath level should be maintained by regular pruning; for safe pedestrian movement and ensure the foliage does not block street light and signage.

4.10.2 Tree Pits

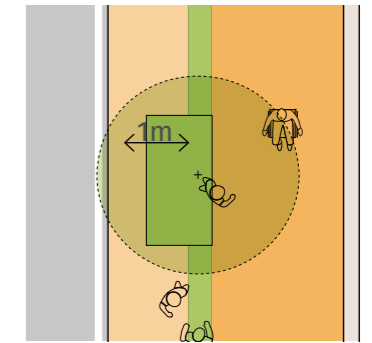


As per IRC:SP:119-2018, the centre-to-centre distance between tree trunks shall be >15m for large trees, >10m for medium trees, and >6m for small trees.

However, the distance can be adjusted based on the canopy size to ensure continuous shade.



Tree pit dimension for large trees



Tree pit dimension for medium trees

As per IRC:SP:119-2018, size of the tree pits should be at least 3.3 sq.m to accommodate roots at full maturity.

It can be achieved keeping minimum of 1.8m as one dimension for large trees or minimum 1m internal dimension for medium height trees.

The dimension for the tree pit shall also be decided based on the diameter of the tree trunk.

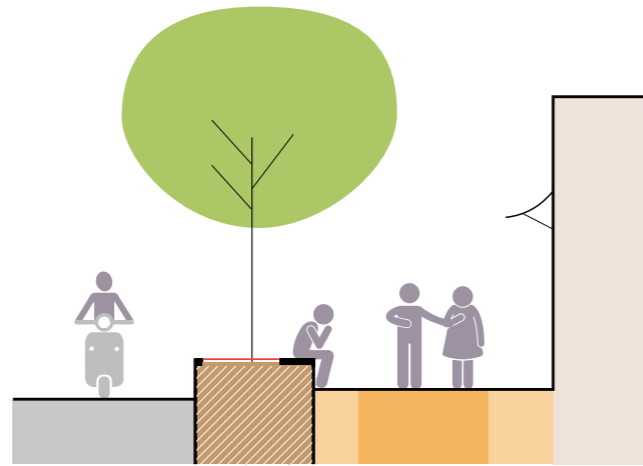
Diameter of tree trunk	Minimum size of tree grate (in m)
Upto 0.15 m	0.6 X 0.6
Upto 0.3 m	0.75 X 0.75
	1 X 1
Upto 0.9 m	1.5 X 1.5
Upto 1.2 m	2 X 2



Tree grating

Surmountable tree gratings in level with the finished footpath surface should be used to ensure appropriate width of the walking zone, for narrow streets and when retaining existing trees.

The grating gaps should be perpendicular to the movement of wheelchairs, with contrasting colour bands along the edges for accessibility.

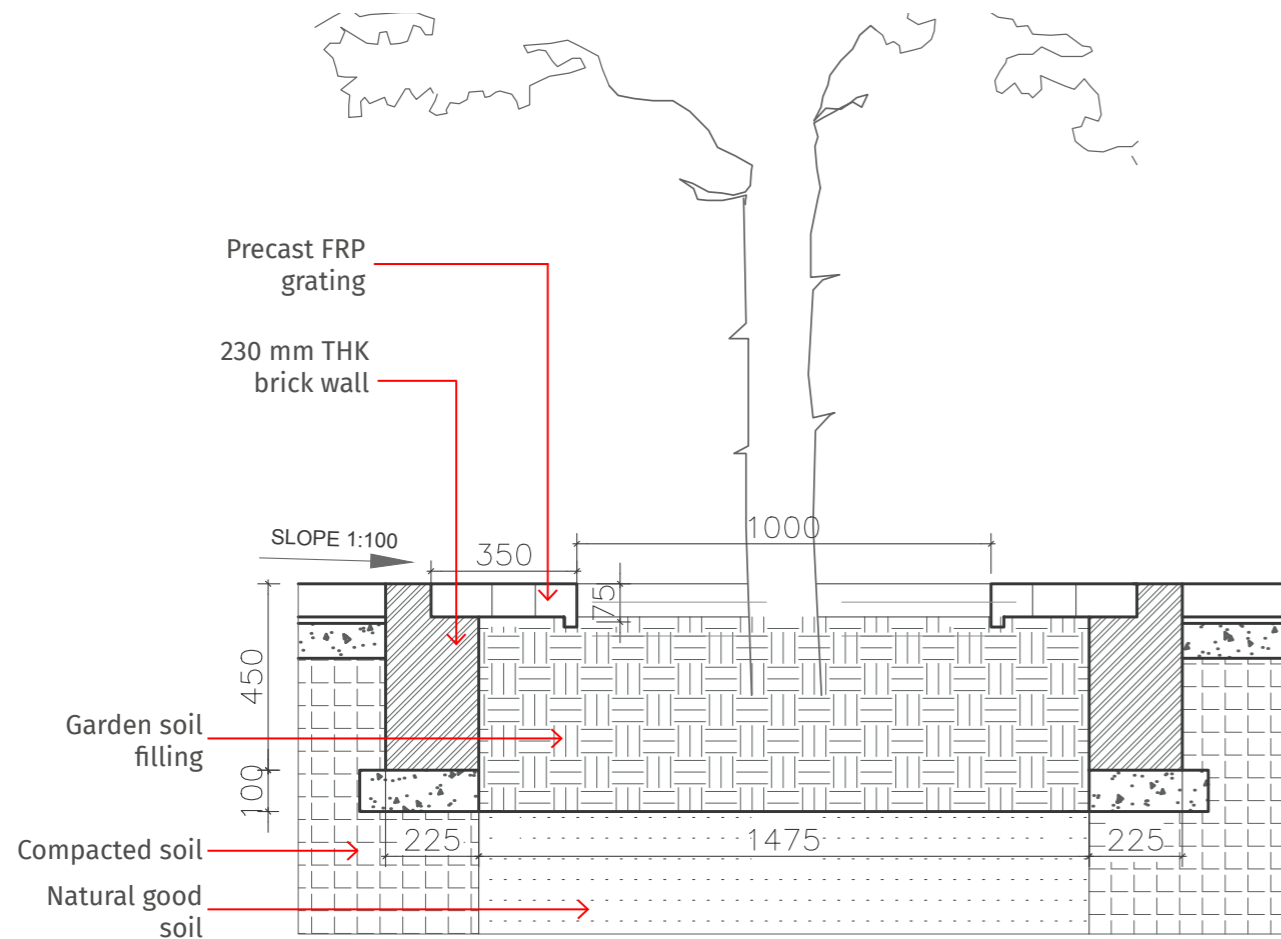


Raised tree pits

Tree pits raised to the height of a standard seating may be provided around trees with exposed roots, ensuring provision for water percolation.

Tree pits should be located in the SEC, ensuring there is no obstruction to the walking zone.

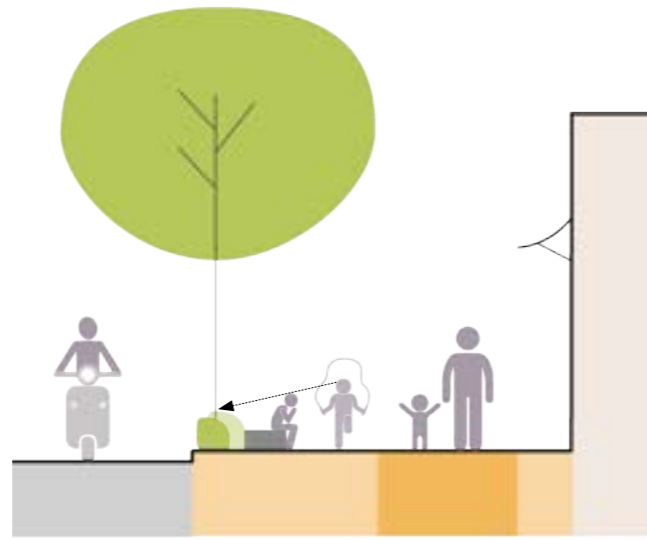
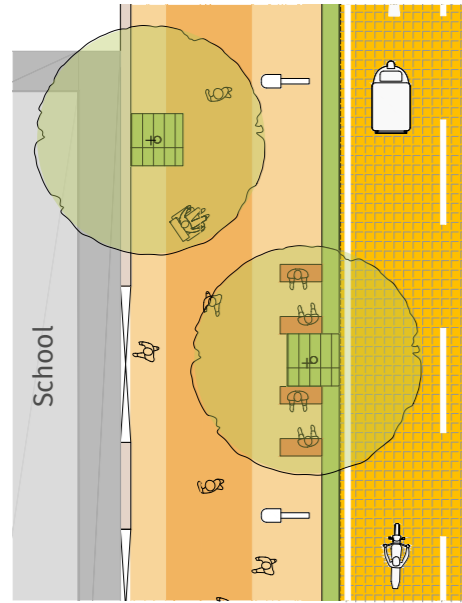
Cross section of a tree pit



4.10.3 Landscape around School Zones

Trees and greenery improves a child's brain development, motor skills and enables creative play behaviour. They also serve as a buffer from the vehicular air and noise pollution and hence is of utmost importance around School Zones.

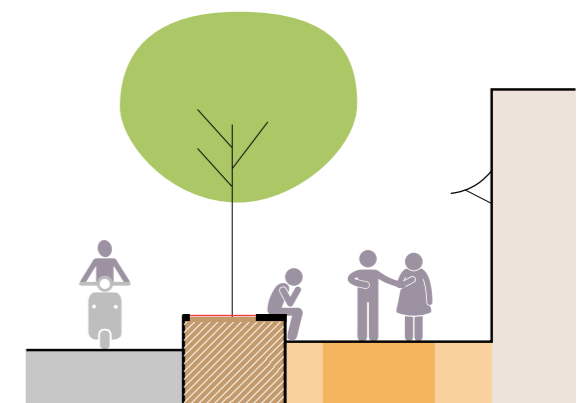
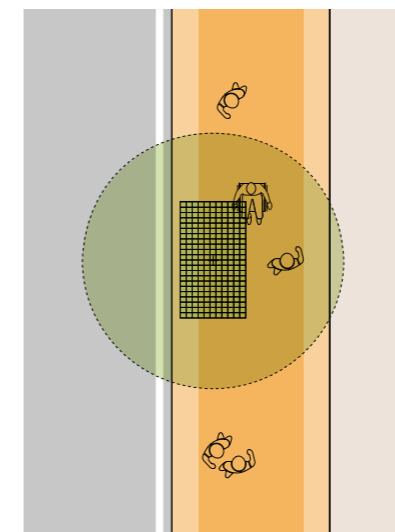
Location and Design



Footpath in the School Zones shall include a 0.5m wide landscape buffer in the SEC zone, along the kerb edge.

Seating and play areas along streets must be designed close to trees to ensure sufficient shade for children.

Children's heights and eye levels must be considered when choosing plant species around School Zones to ensure that children can see the vehicles and vice-versa.



Streets must be designed with planters and walkable tree pits to maximize space for walking.

Walkable tree pits must be made using permeable materials and shall be a minimum of 1.5 m by 1.5 m in size, while allowing for an accessible clear footpath.

Tree pits raised to the height of a standard seating may be provided around trees with exposed roots within School Zones.

Tree species

The selection of tree species for Thoothukudi's streets should be based on the available Right of Way (ROW) to ensure proper growth, minimal maintenance, and maximum environmental benefits. The table below provides recommended tree species categorized by ROW width, prioritizing native and well-adapted species for urban resilience and ease of maintenance. Min 3-4 year old trees saplings have to be planted to ensure better tree growth.

Street ROW	Recommended Tree Species	Remarks
Local Roads (ROW <15m)	Putranjiva roxburghii (Putranjeevi) Bauhinia purpurea (Mantharai) Ixora pavetta (Chulundu)	Compact trees with non-invasive roots, ideal for narrow streets
Collector Roads (ROW 30-15m)	Thespesia populnea (Poovarasu) Calophyllum inophyllum (Punnai) Barringtonia acutangula (Neer Kadambu) Pongamia pinnata (Punga maram)	Hardy trees suitable for medium-width streets and coastal resilience
Sub-Arterial Roads (ROW 45-30m)	Terminalia catappa (Natvadumai / Naatu Badaam) Pongamia pinnata (Punga maram) Lagerstroemia reginae (Poo Maruthu) Saraca asoca (Asokam)	Medium to large trees with shade and flowering benefits
Arterial Roads (ROW 60-45m)	Ficus religiosa (Arasa maram) Albizia lebbek (Vaagai) Terminalia arjuna (Neer Marudhu) Dalbergia lanceolaria (Erigei)	Large canopy trees providing extensive shade, suitable for road medians and wide open spaces

Other tree species can be used based on the specific street context, space availability, and environmental conditions.

Preference should be given to native species as they are better adapted to local soil, climate, and require minimal maintenance.

Trees should be selected to avoid obstruction to pedestrian movement and prevent damage to footpaths and underground utilities.

At least 100 trees shall be planted, per planting row, per side within one kilometre distance, as per IRC:SP:119

Right of Way	Minimum no. of trees/km
<35m	200
35-45m	300
46-60m	500
61-120m	700

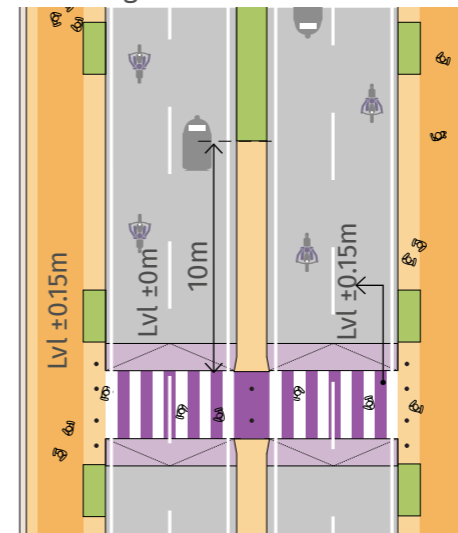
Refer street template of 18m RoW representing tree corridor & 24m RoW representing integrating tree corridor and footpath



Well-shaded footpaths in Pondy Bazaar, Chennai

4.10.4 Plantation at Median and Traffic Island

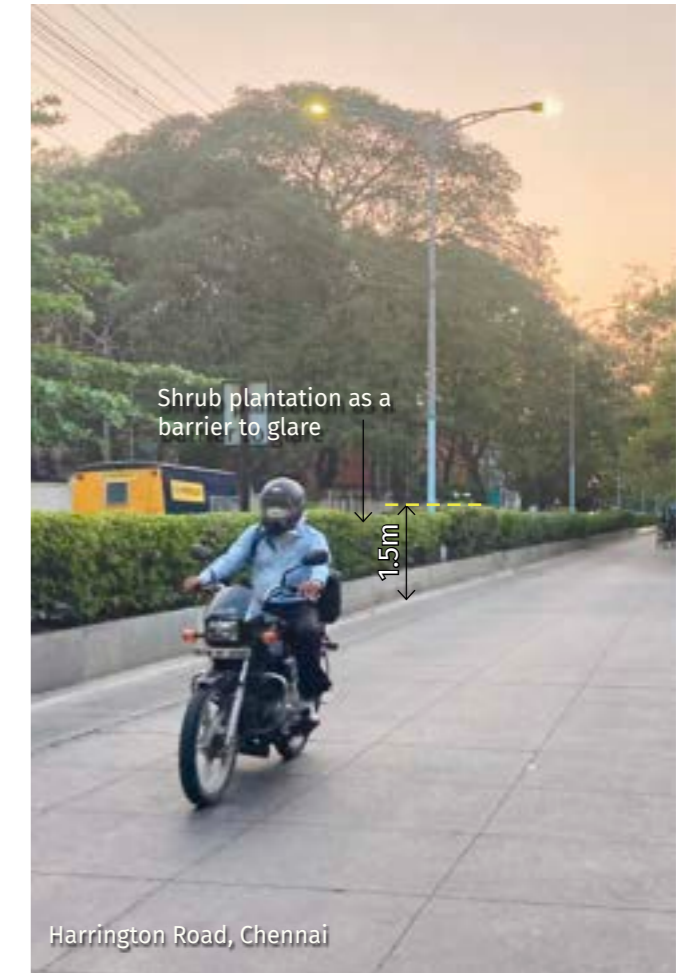
To sustain green spaces, methods such as drip irrigation and underground tanks can be employed for efficient watering.



At Median

At mid block crossings, shrub plantations should be discouraged within 10m from the pedestrian refuge to improve visibility for pedestrians, especially children.

Shrubs up to 1.5m in height should be planted in medians to minimise headlight glare from the opposite direction. When the available clear width of landscaped area in a median is more than 1m, a row of small or medium trees can be planted.



Harrington Road, Chennai

Traffic island

Plantation in traffic island should be avoided. In areas with a low water table, roundabouts can include bio swales and detention ponds. Dense clumps of large shrubs or low-branching trees should be avoided to maintain visibility across the carriageway.

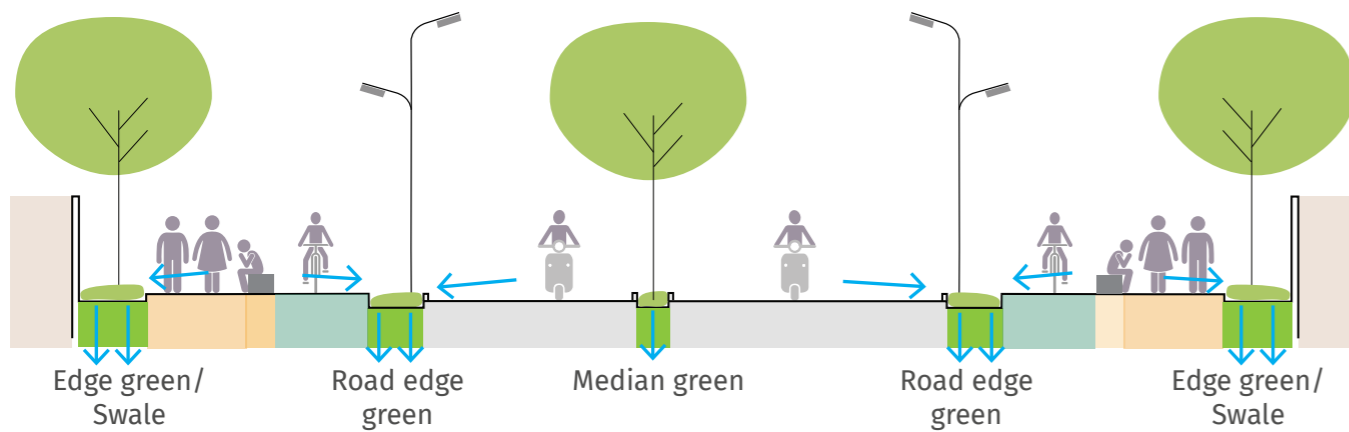
In larger traffic islands, high-branching, well-pruned trees can be planted, ensuring a clear height of 4.5m from the carriageway level.



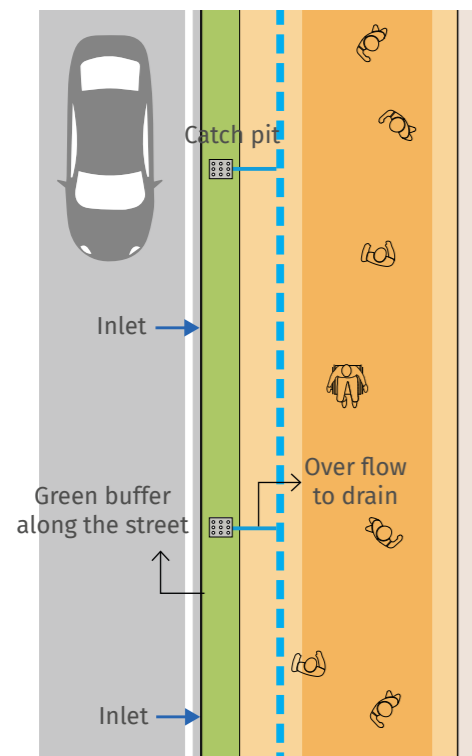
Palanganatham, Madurai

4.10.5 Natural Storm Water Management

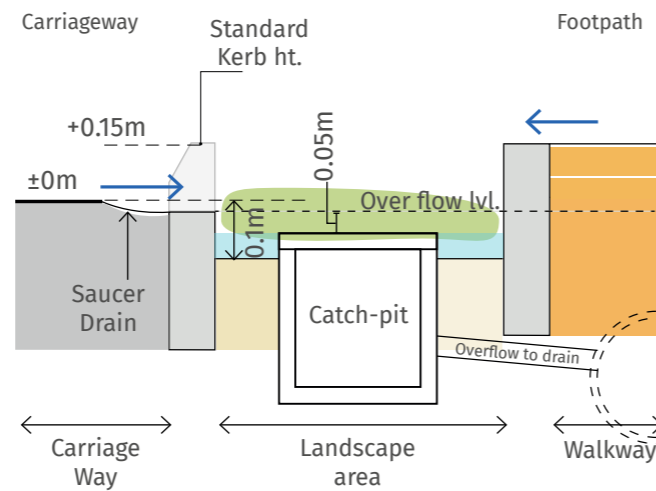
Effective storm water management on streets is crucial to prevent flooding, safeguard water quality, and ensure the overall resilience of urban infrastructure.



Kerb Side Detail



Refer IRC:SP:50-2013



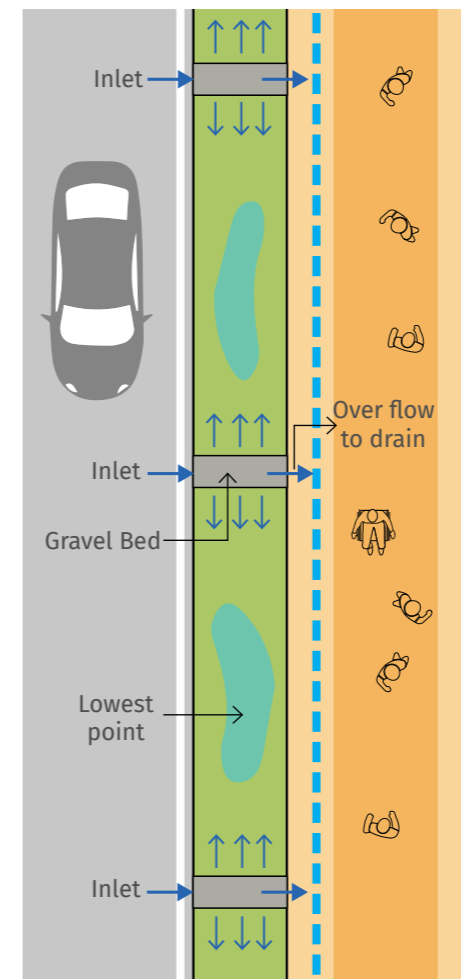
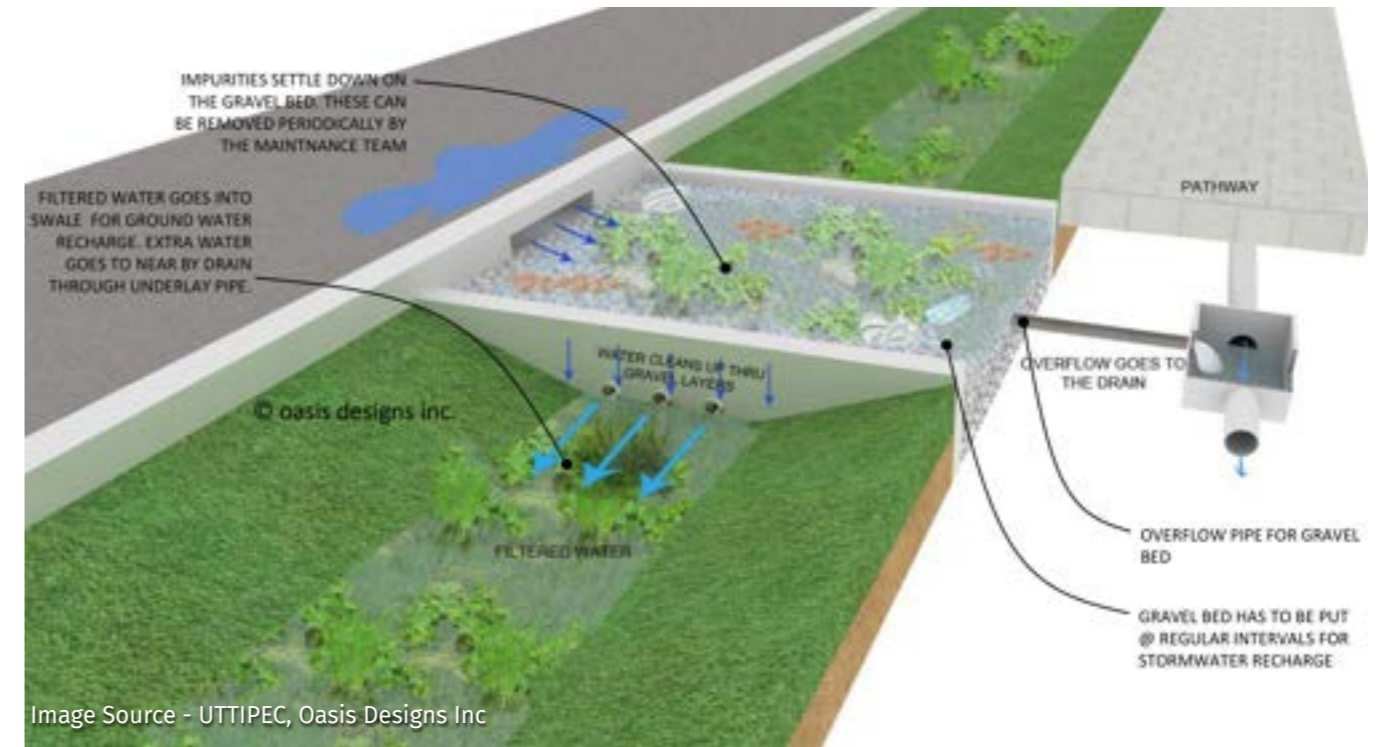
Road edge green with catch pit

catch pit provided in adjacent green strip allows extra water to go to nearby drain through underlay pipe.

Catch pit manhole cover should be minimum 0.1m above the soil bed and 0.05m lower than the road level.

Water Filtration

It involves strategically planting vegetation alongside roads to capture and filter storm water runoff. The green buffer serves as a natural filter, trapping pollutants and promoting infiltration, thus enhancing water quality and mitigating the adverse effects of urban runoff on local ecosystems.



Swale

A swale is a shallow, vegetated depression to manage storm water runoff, promoting infiltration and reducing erosion.

Rainwater flows into the gravel trench, where it gets filtered. The filtered water then goes into the swale. Any excess water from the swale flows into the drain beneath the pathway.

It can be implemented alongside streets, parking lots, landscaped buffers or wide green spaces.

Width of the swale should not be less than 0.9m and depth should be 0.6m with an ideal slope ratio of 2-5%.

Refer section 2.1.5. on Utilities for other storm water management solutions.



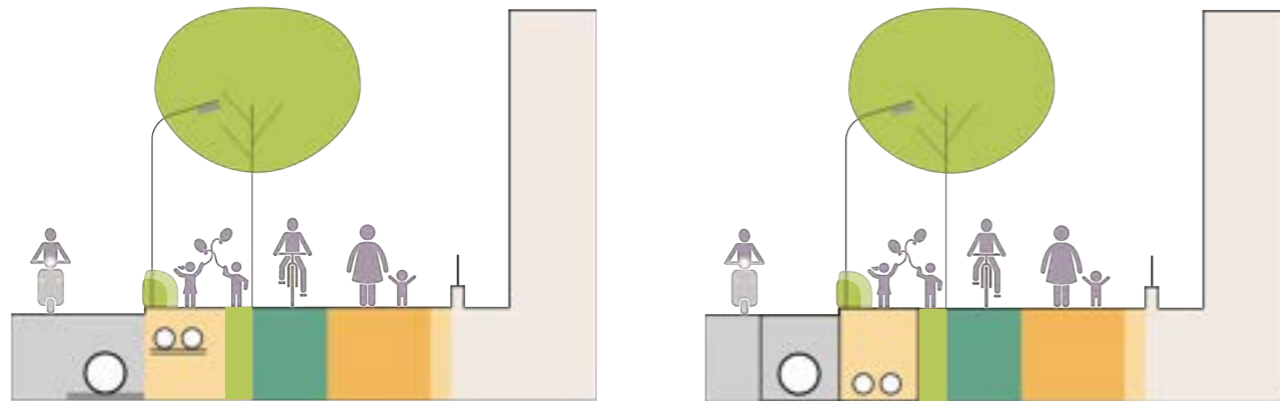
5

Underground Utilities

- 5.1. Utility Corridor
- 5.2. Storm Water Drains
- 5.3. Standardised RoW with Utility Placements
- 5.4. Contextualising a Street Template

5.1 Utility Corridor

Underground utilities shall be planned as an integrated network, taking existing contour levels into account. Each utility department shall prepare a coordinated 5 year utility network plan. In greenfield areas, utilities shall be implemented as per the recommended guidelines, while in brownfield areas, coordinated design and utility integration shall address existing site constraints. The overall concept of Utility allocation shall be adopted in all cases, with sizes and depths varying based on on-site conditions.



Ducts

Ducts are long-lasting casing pipes (RCC/HDPE/GI) which carry utility lines and are buried directly in the ground on a PCC bed/compacted soil layer, eliminating the need for a concrete passage.

Trench

A trench passage built underground to carry utility lines, covered with an in-situ concrete slab or precast concrete covers.

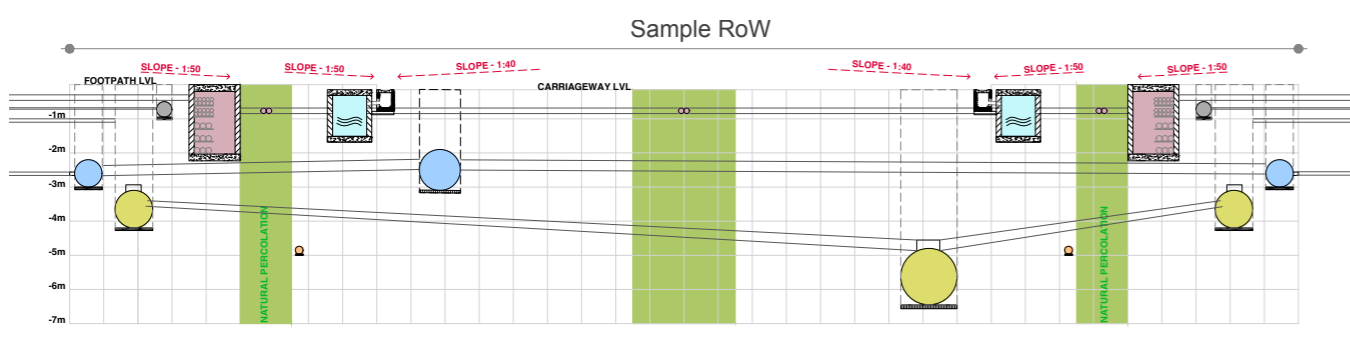
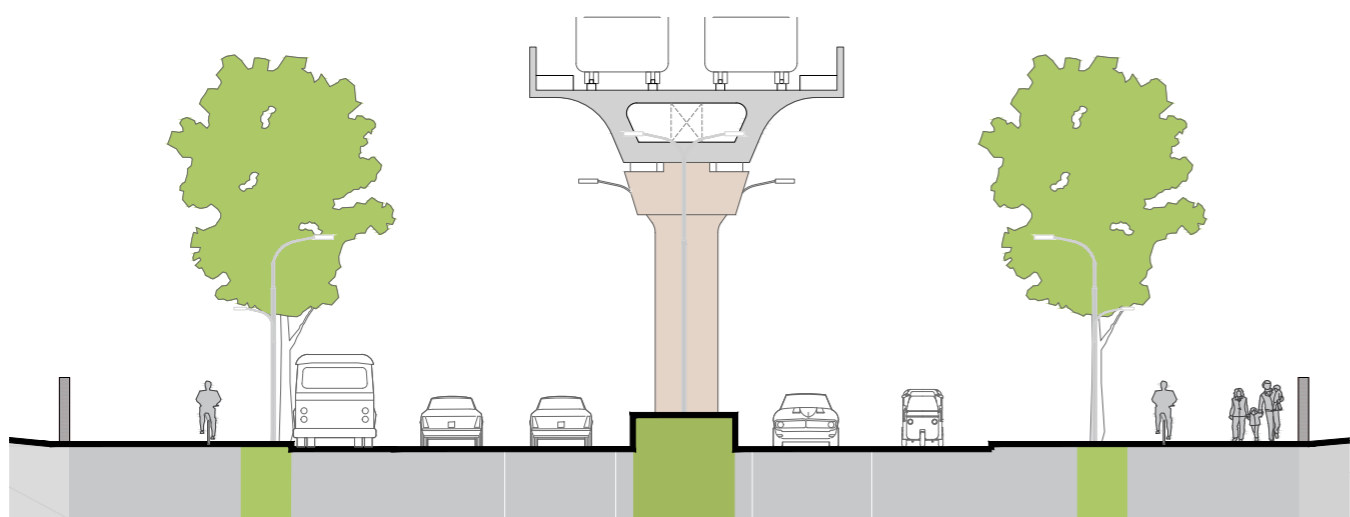
Aspects	Duct	Trench	Duct Vs Trench
Type			Generally ducts are recommended. In case of SWD, they have less friction, better flow and easy to install. In exceptional cases, trench may be adopted.
Cost			The laying of ducts costs only 30-35% as that of the construction of trenches.* <i>* Tender SURE Specifications for Urban Roads Execution</i>
Time			Ducts require less time for execution than trenches.
Flexibility			Ducts provide greater flexibility and can be manoeuvred around trees & obstructions.
Sustainability			Ducts are more environmentally sustainable compared to trenches, as trenches use cement concrete for construction, prevent rain water percolation, & obstruct growth of tree roots.



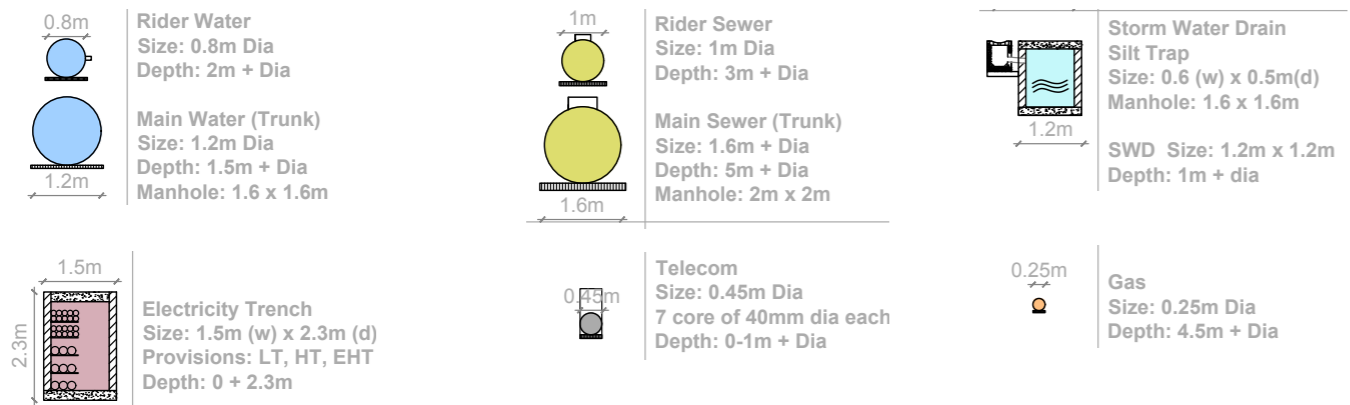
Ducts in DP Road, Pune



Trench implementation works in Pondy Bazaar, Chennai

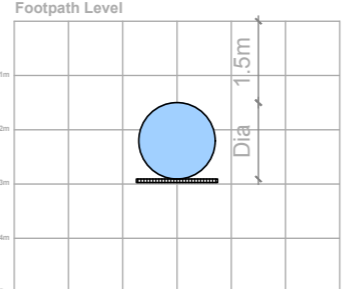


Illustrative sample of RoW with Utility Placements



Placement of Duct Depth

Each utility shall be placed at a minimum specified depth to avoid conflicts with other utility lines and street elements. The following illustration explains how to interpret the minimum depth requirements across different Right-of-Way (RoW) sections. In reality, existing contour shall determine the actual depth.



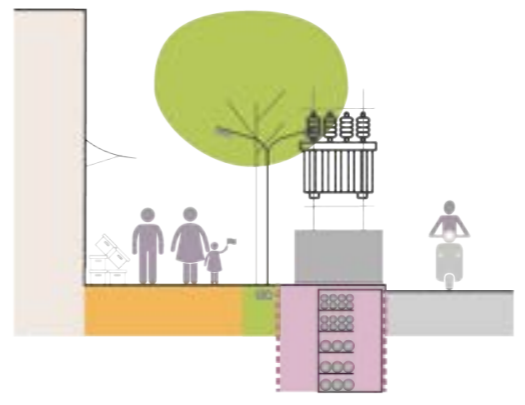
“Dia” refers to the respective diameter or size of the pipe, determined based on demand requirements.

Note:

1. For brownfield development, existing utilities on each street shall be assessed prior to implementation, and the proposed concept shall be customised accordingly based on existing condition.
2. For streets carrying multiple main or utility lines, the minimum required depth shall be specified to ensure accommodation of all utilities.
3. Utility continuity across railway tracks, rivers, or grade separators shall be assessed on a case-by-case basis, with underground connections preferred wherever feasible.
4. Utilities shall be planned and resolved at the network level. Manholes at junctions shall be avoided, and solutions shall be developed on a case-by-case basis, considering the available road hierarchy and site conditions.
5. The proposed concept shall incur huge capital investment (~80-90% more than existing practise) during implementation but beneficial when lifecycle cost and road cut cost is considered.

5.2.1 Electrical

Electrical lines include low, high and excessive high tension cables which carry power to properties and transformers respectively, overhead cables, connections to street lights, surveillance cameras, and utility boxes/RMU units.



Location

Along kerbside or Multi Utility Zone both underground and above-ground electrical utilities.

Type of Utilities

Above-Ground: Transformer, Street Light, Utility Box, Pillar Box, Mini-Pillar Box

Below Ground: LT, HT, EHT Lines

Other allied provisions

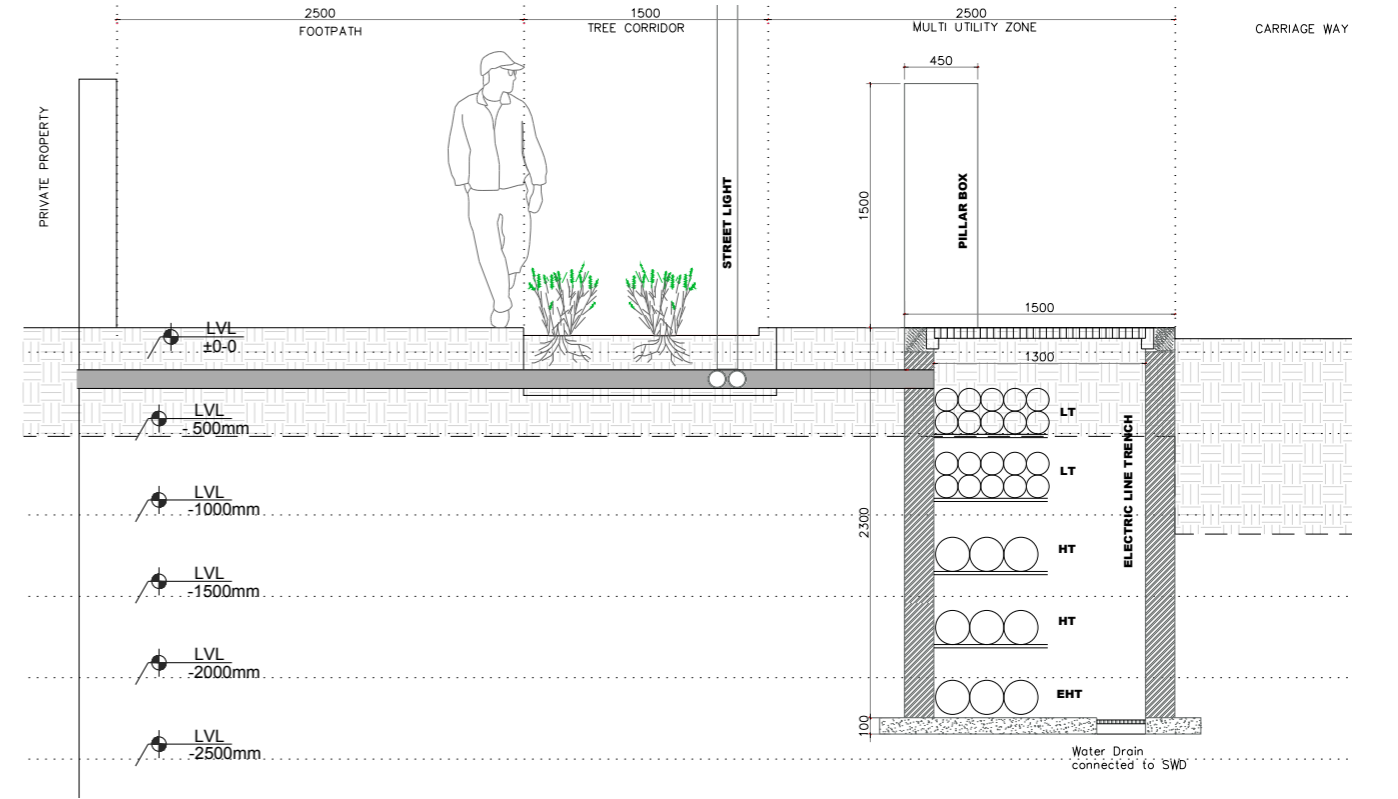
Electrical connections for on-street EV charging infrastructure, advertisement boards, or other allied provisions shall be drawn from the recommended utility trench. Such provisions shall be permitted only within the MUZ.

Bundling of Cables

Cables for street lights, surveillance cameras, etc. are small enough to be bundled and buried through ducts in the planter zone at the edge of the footpath, eliminating the need for manholes and deep digging. Overhead electrical cables shall be avoided.

Chamber Details

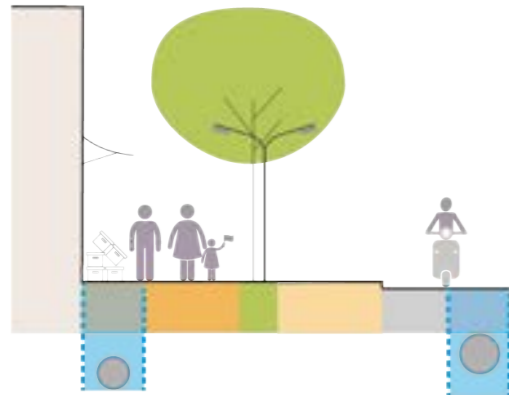
Recommended to provide an inspection chamber at every 30m interval for a size of 0.6 x 0.6m



Typical cross section across electrical trench

5.1.2 Water Supply

Water supply lines carry potable water under pressure, and it is run on natural contour - gravitation. Chambers with control valves are generally provided before connecting the main supply to adjacent properties. Additional connections can be made in future from these control chambers.



Location

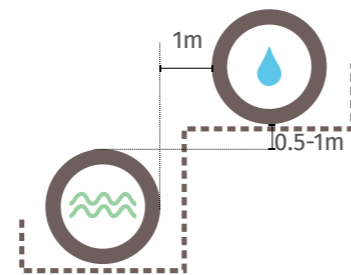
Rider lines shall be provided next to property edge and main lines, pumping mains shall be provided close to median under carriageway

Type of Utilities

Transmission lines: Pumping Mains
Distribution Lines: Rider and Mains

Chamber Details

Recommended to provide an inspection chamber with valve at every 50m interval for a size of 0.6 x 0.6m for Rider lines and at 100m interval for main line

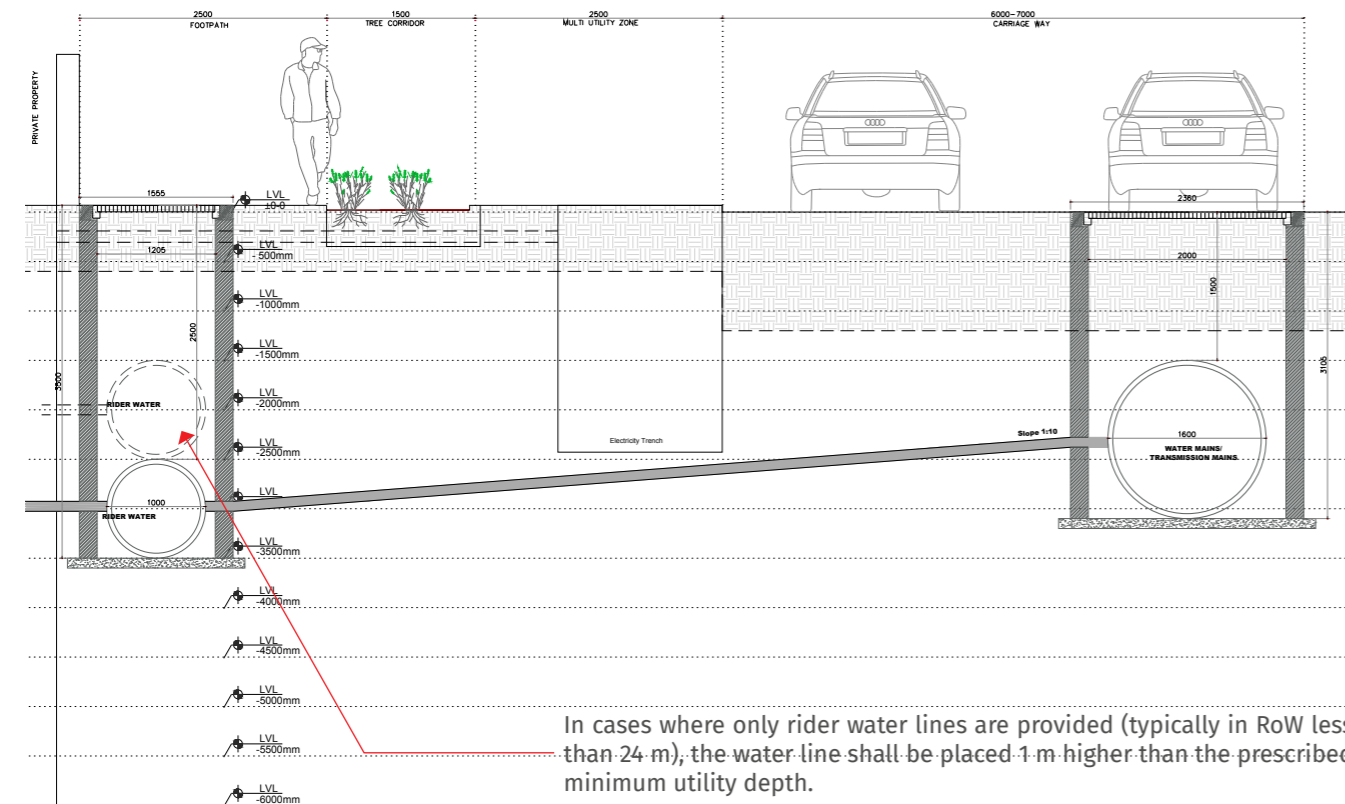


Ductile Iron (DI) pipes are typically used.

In Relation to Sewer Line

Horizontal clearance of 1 m should be maintained between water and sewer lines to avoid contamination of the water line in case of leakage.

In case of lack of space, water line should be placed above the sewer line with vertical 0.5 m-1 m.



Typical cross section across Water Supply Duct through Inspection Chamber

5.1.3 Sewerage

Sewer lines convey greywater and blackwater from residential and industrial sources. The system comprises main trunk lines and connecting rider lines. All property connections shall connect through manholes (machine holes) and not directly to the pipeline, with each machine hole serving approximately 6-8 connections.

Sewer and drainage lines operate on gravitational flow and shall be aligned parallel to the road centreline to ensure efficient functioning and maintenance.

Location

Trunk sewer lines should be located below the carriageway. Rider sewer lines should be located below the footpath.

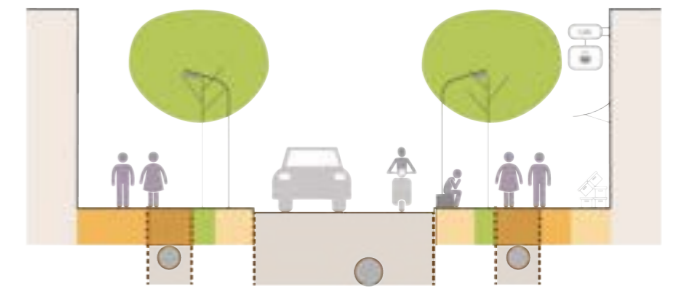
Rider sewer line should not be laid above water line, in order to avoid contamination of potable water with sewage water in case of a pipe burst.

New connections can be made to the rider sewer, as it can have multiple such connections.

Double Walled Corrugated pipes are typically used.

Chamber Details

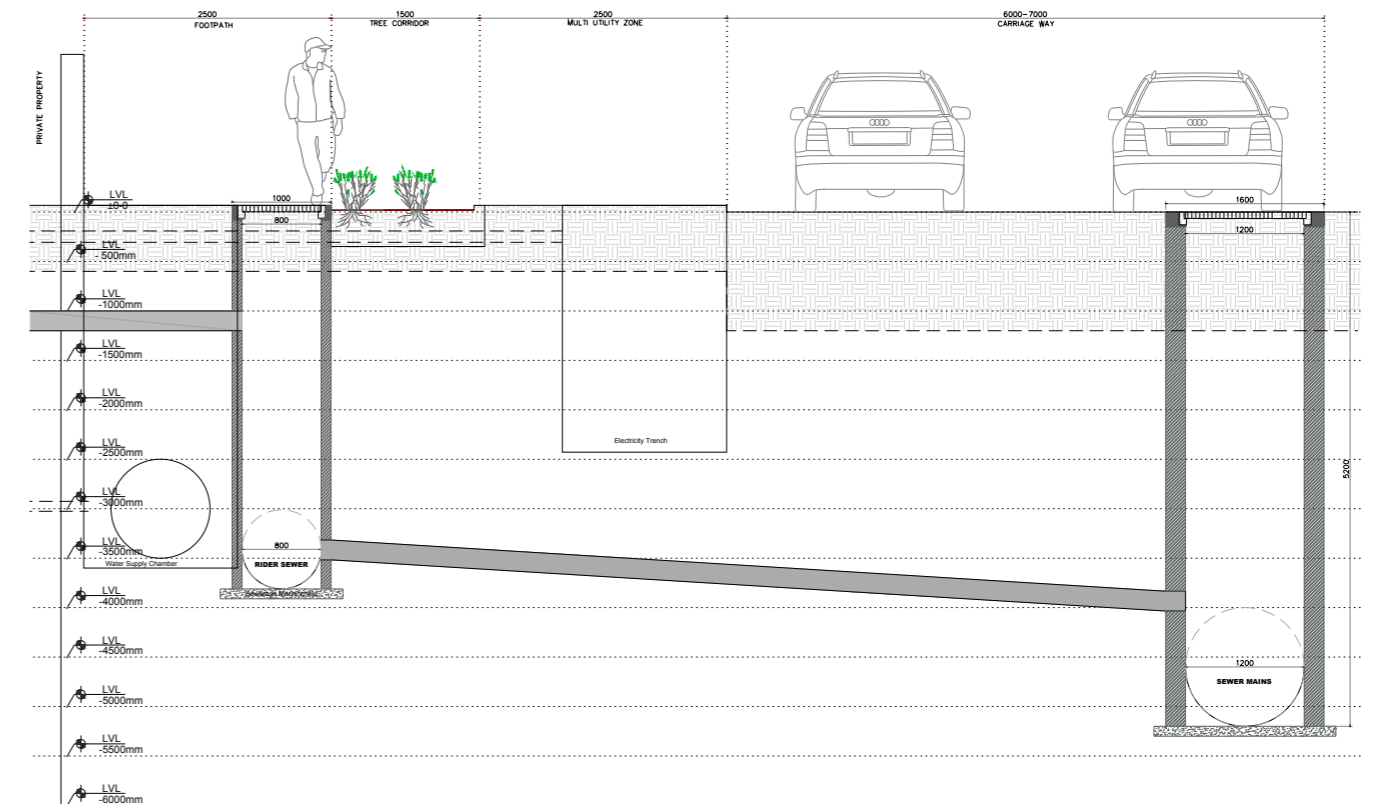
Recommended to provide an inspection chamber at every 30m interval for a size of 0.6 x 0.6m for Rider lines and at 100m interval for main line



Type of Utilities

Transmission lines: Pumping Mains and Sewer Mains
Collection Lines: Rider Sewer

Above Ground: Lift stations (shall be provided in MUZ where ever required)



Typical cross section across Sewerage Duct through Machine Hole

5.1.4 Telecommunications

Telecom lines include CATV/VI cables, optical fibre cables, conventional copper cables key section and connections for surveillance & security units. Common manholes should be provided for lines run by both public and private telecom operators, such that the ducts are not disturbed during maintenance. No overhanging cables shall be permitted.

Location

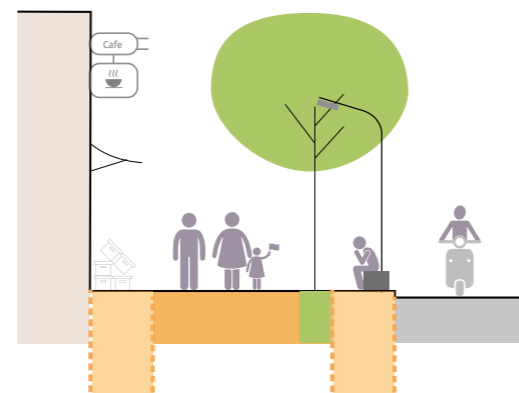
Along property edge or kerbside, so utility boxes can be placed at the edge without obstructing the footpath.

Copper telecom cables should not be placed close to electric cables to avoid electrical interference due to induced voltage. A min distance of 1-1.2 m should be provided between the two to avoid magnetic induction. (in case of conventional copper cables).

Stacking of ducts

Lines run by government and private operators can be run through 7 core pipe, and accessed through a single manhole.

High Density Poly Ethylene (HDPE) Pipes are typically used.

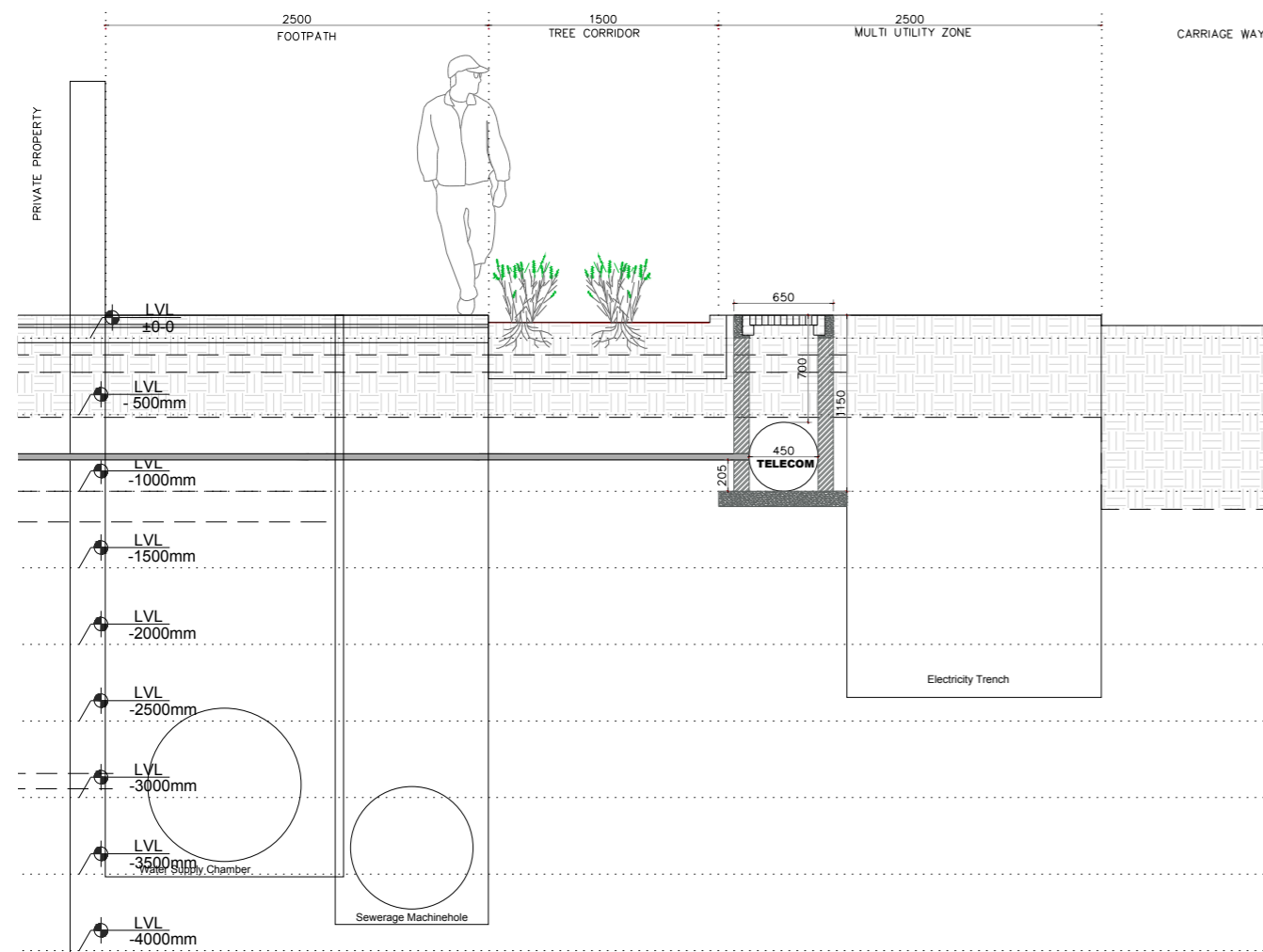


Type of Utilities

Underground: Transmission lines and Fibre Optic Access Termination (FAT) box
Above Ground: Distribution box (FMS)

Chamber Details

Recommended to provide an inspection chamber at every 150-200m interval for a size of 0.3 x 0.3m. If the road has many intersections points, then a chamber near every intersection.



Typical cross section across Sewerage Duct through Machine Hole

5.1.5 Gas

Gas mains and other ducts carrying combustible material should have clear visible markers above the ground. These markers should denote the type, location and date of installation with emergency contact numbers. The guidelines for these utilities should be strictly followed under expert supervision.



Other Guidelines

Consolidation

In case of lack of adequate space, dry utilities like telecommunication, electricity, etc. can be consolidated and stacked together to minimize the space occupied. Permissions from respective agencies must be obtained before consolidation. Manholes must be provided at regular intervals for ease of access and maintenance. Common manholes can be used for government and private connections with proper stacking of utilities.

Future Demand

Additional empty ducts should be provided which can be used in the future for new connections or different utilities avoiding the need for unnecessary excavation.

Abandoned Lines

Abandoned ducts and trenches should be reused or consolidated if duplicate or defunct lines are discovered during utility mapping. On-site engineers and the respective utility agencies should be contacted for re-routing. The decision to reuse or retrofit existing lines should be taken by the engineers based on their conditions and cost-effectiveness.

Identification System

Identification systems for underground utilities and crossings on the footpath should be established. These may be in the form of colour coded chamber covers or other similar marks which will make it easier to locate later. CUMTA shall prepare an SOP for identification system.



Network of underground utilities at different levels in DP Road, Pune

5.2 Storm Water Drains

Stormwater drains must be designed as an integrated network (contour based storm water cluster) from collection to discharge points, aligned with the existing natural contours to ensure efficient flow and minimise flooding. The on-ground network should prioritise sustainable drainage principles and incorporate the following components:

- **Filtration:** Use bioswales, catch pits, and other natural/engineered filtration features to remove sediments and pollutants at the source.
- **Conveyance:** Provide well-designed ducts and channels that guide stormwater safely through the network, respecting topography to maintain natural flow paths.
- **Infiltration:** Integrate groundwater recharge pits and pervious surfaces to increase infiltration and reduce surface runoff.
- **Retention:** Include retention tanks to temporarily store stormwater and release it gradually, supporting water security and minimising peak flow loads.
- **Detention:** Use detention reservoirs to manage excess runoff during heavy rainfall and mitigate downstream flooding.

The final discharge point of the stormwater drain should always include a filtration or treatment system to ensure only clean water enters natural waterbodies or reservoirs.

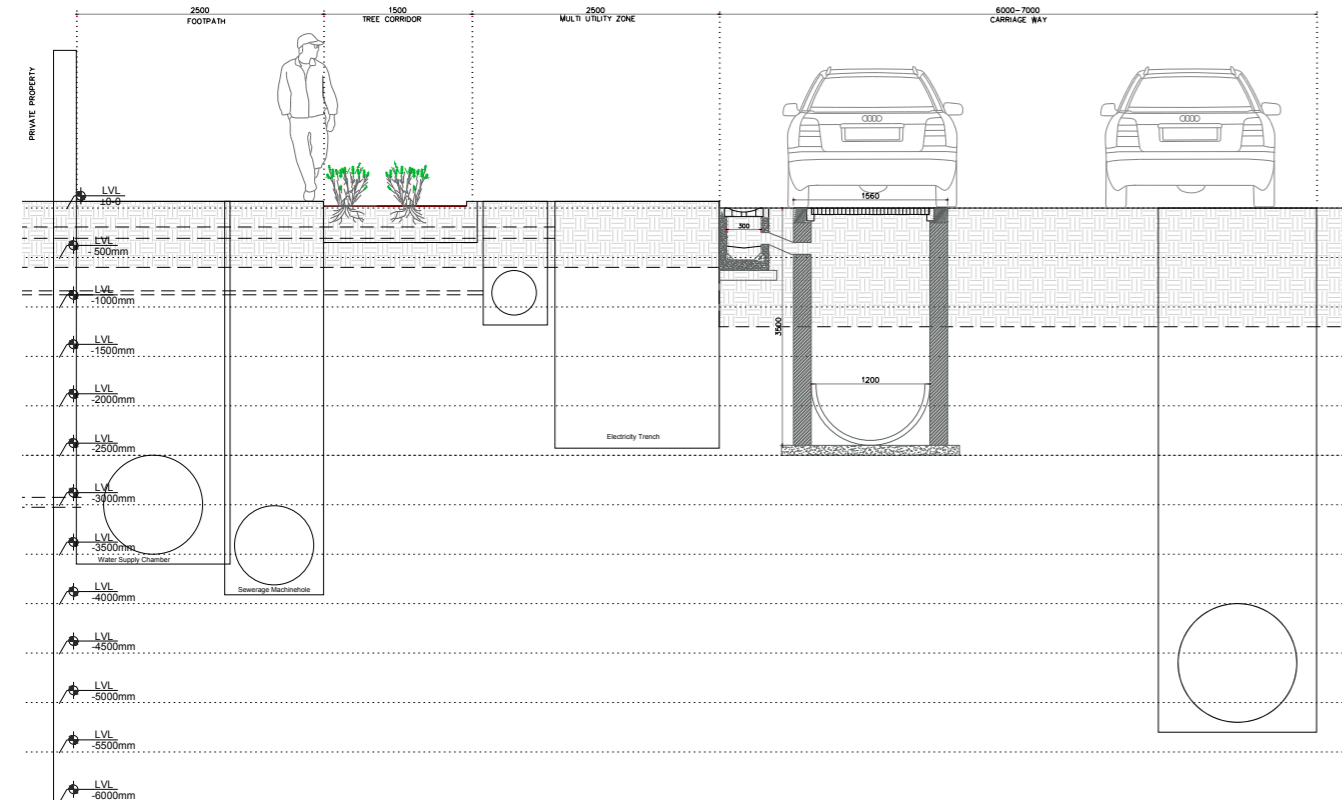
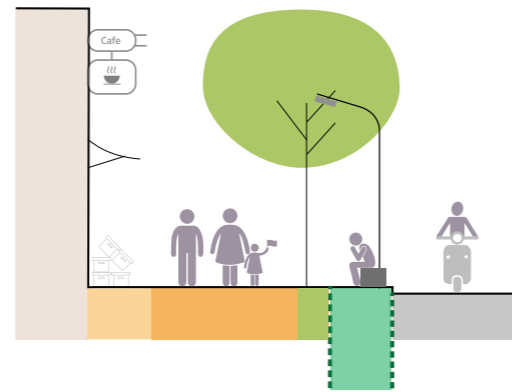
*For detailed guidelines, please refer to IRC-SP-50 2013 - Guidelines on urban drainage

Location

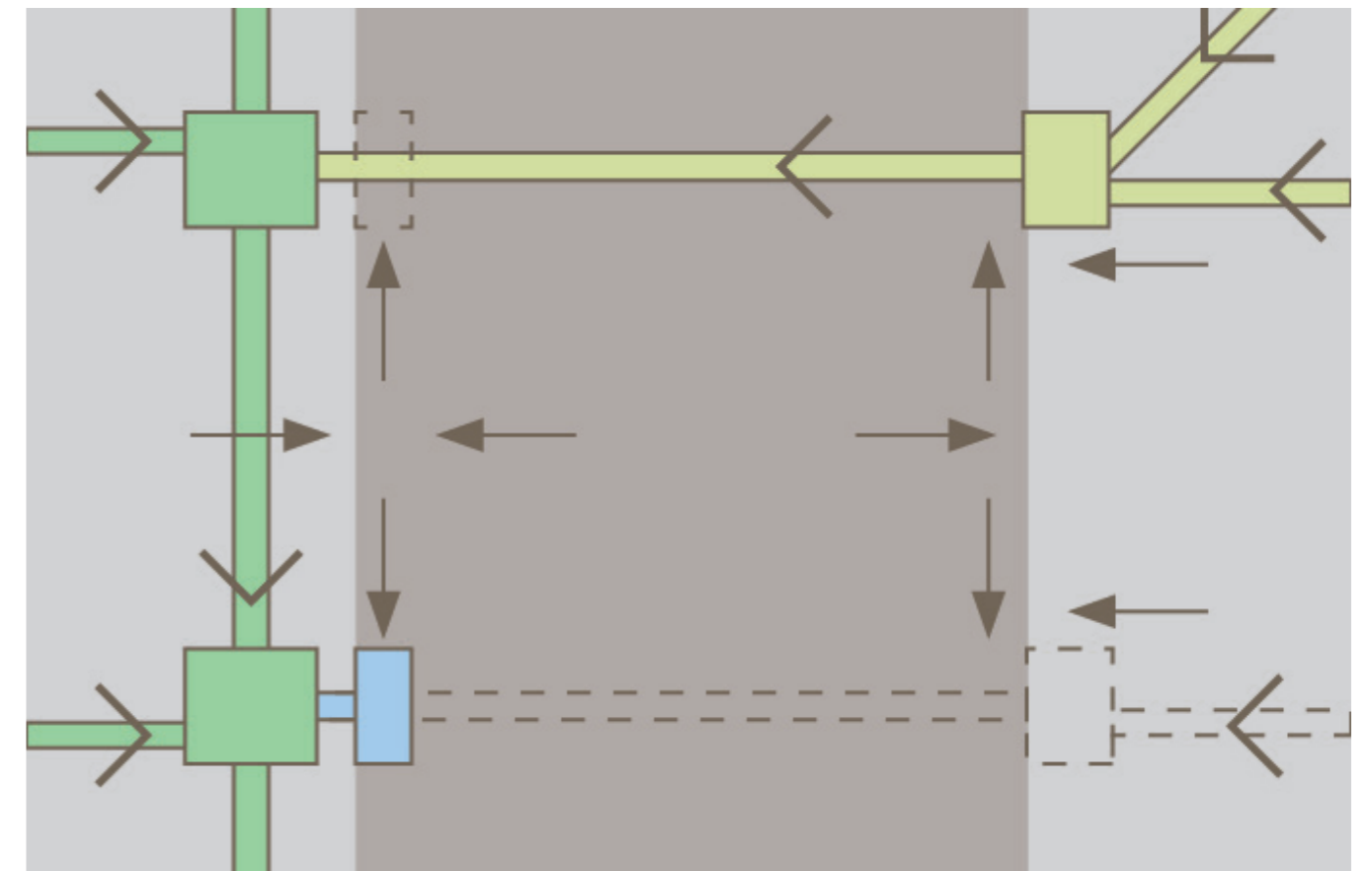
Along carriageway edge with silt catch pits at regular intervals. These shall not be provided at the property edge.

Connections

Connections from other utilities to properties can be easily made over ducts, making them advantageous over conventional trenches. Illegal sewer connections into storm water drain are prevented when ducts are used instead of trenches.



The size of the storm water drain shall be considered as per design requirements considering the surface run-off, catchment area, etc.



Storm water Manhole Dummy Chamber Catchment Pit

Storm water drainage network diagram

Storm water Manhole

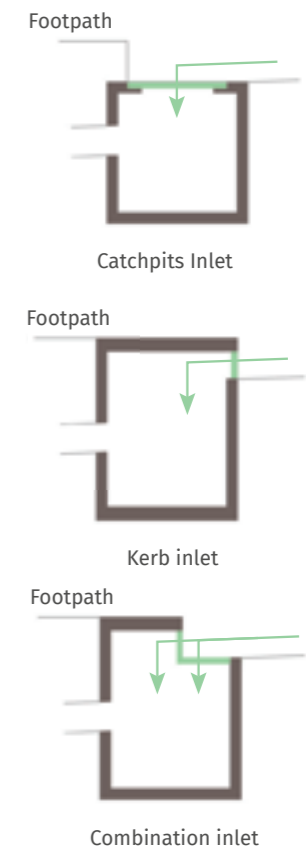
Storm water manholes collect water from the adjacent properties through ducts and from catchpits. They can have kerb-inlets on the surface to collect runoff water, removing the need for separate catchpits. Manholes are to be designed to withstand respective vehicular load in case of motorable drains proposed on Carriageways.

Catchment Pit

Catchment pits collect surface runoff from the carriageway, sidewalk, and private properties. The longitudinal and transverse gradient of the surface should be maintained as mentioned in IRC-SP-50 2013 (Guidelines on Urban Drainage) which recommends cross slopes of 2-2.5% for travel lanes.

Storm water from the road flows along the saucer drain (along the kerb) into the catchment pit through inlets. Catchment or catch pits are designed such that silt is collected in the chamber through sand/gravel filters before the water flows into the main storm water drain.

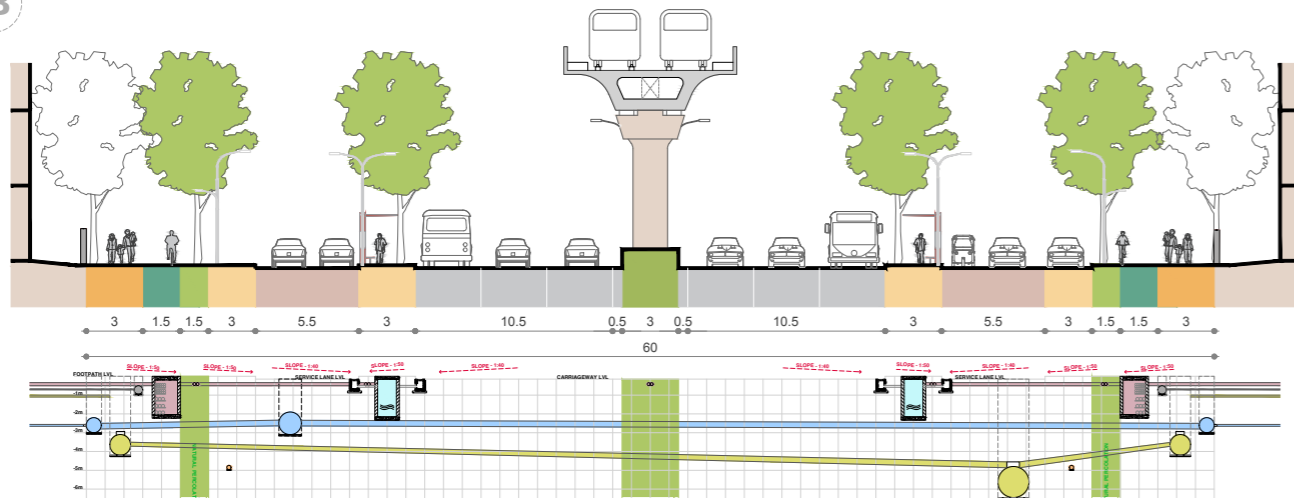
The depth of the catch pit can vary from 450-600 mm, with a width of approximately 300mm. Catchpits should be located at the lowest point of the street cross-section and at regular intervals decided by their size, average rainfall, and the catchment area.



Types of catch pit openings

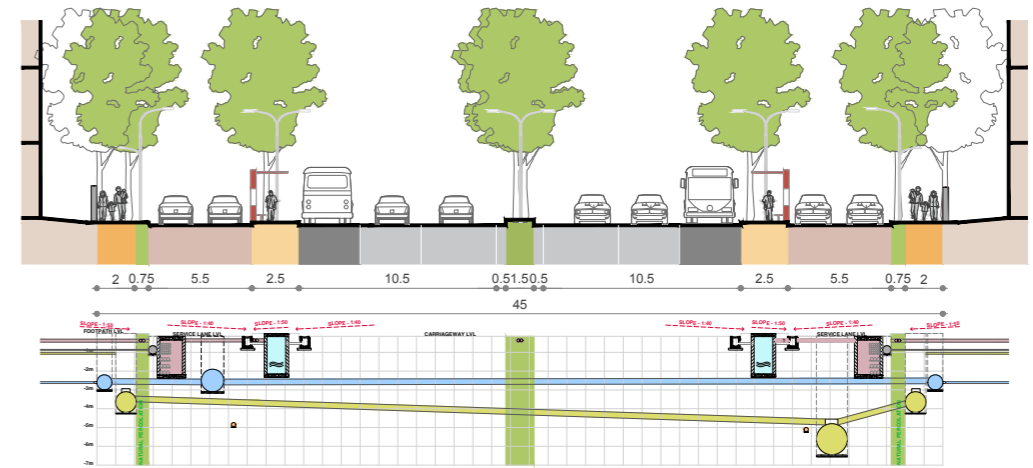
5.3 Standardised RoW with Utility Placements

1B



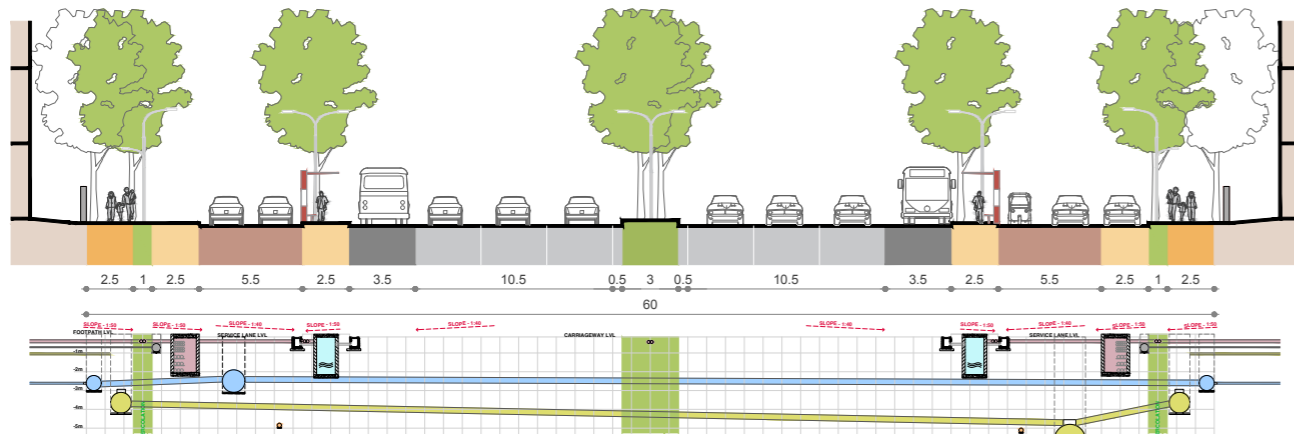
Arterial Road - 60m - With Metro

1C



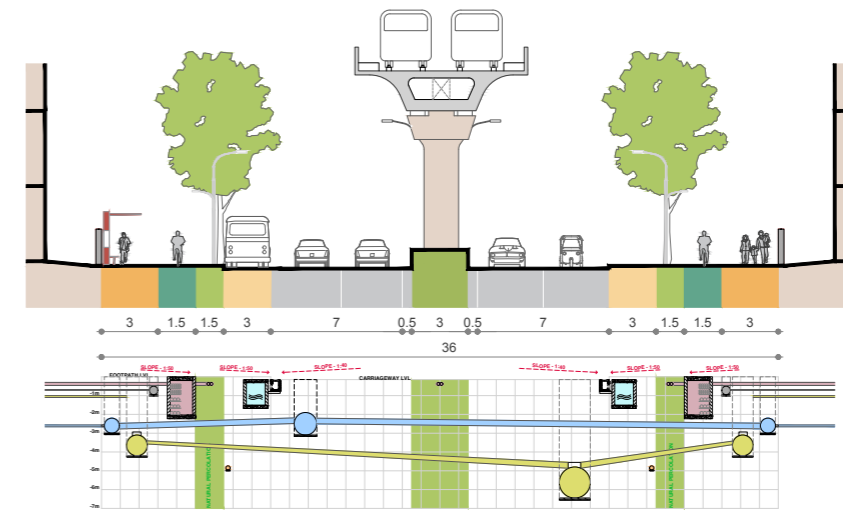
Arterial Road - 45m - With Bus Priority Lane

1A



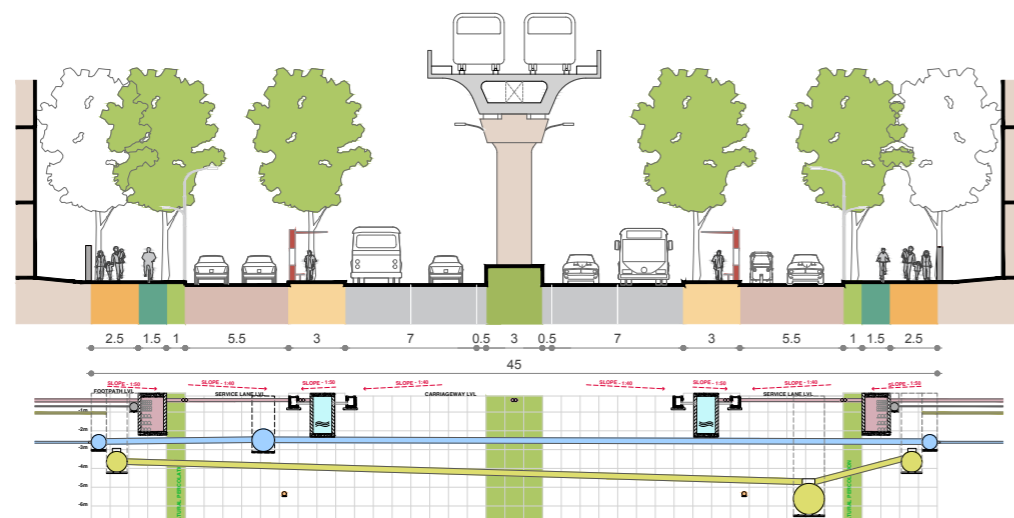
Arterial Road - 60m - With Bus Priority Lane

2B



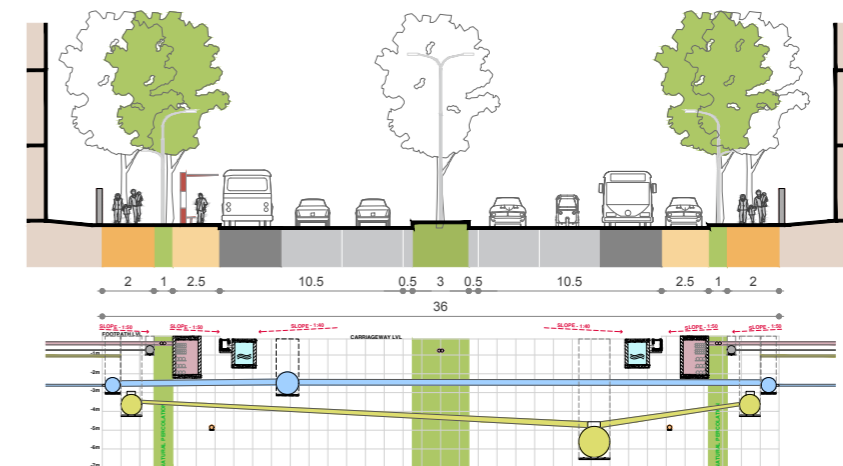
Sub Arterial Road - 36m - With Metro

1D



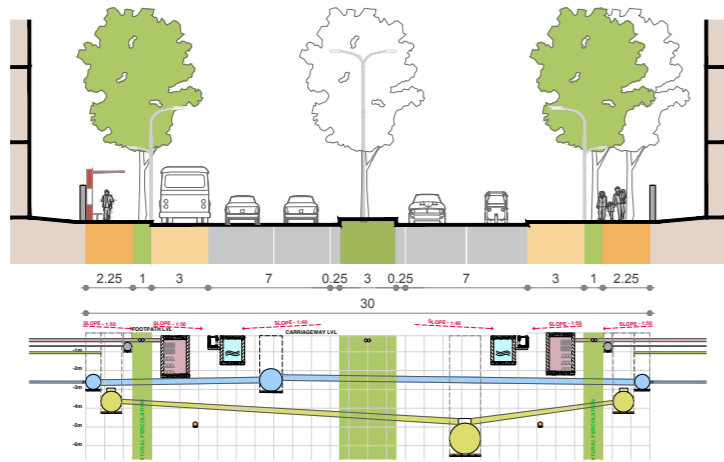
Arterial Road - 45m - With Metro

2A



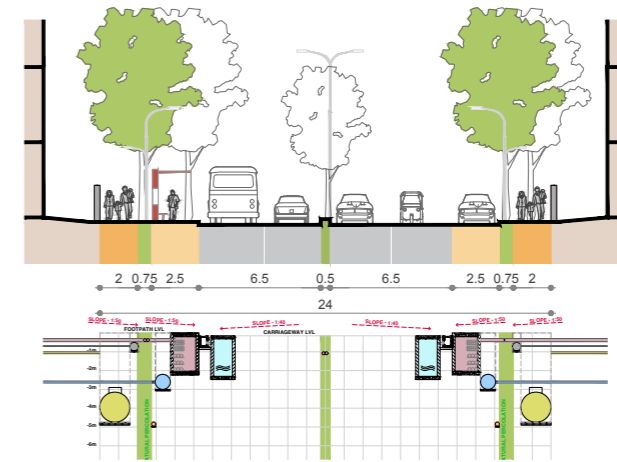
Sub Arterial Road - 36m - With Bus Priority Lane

2D



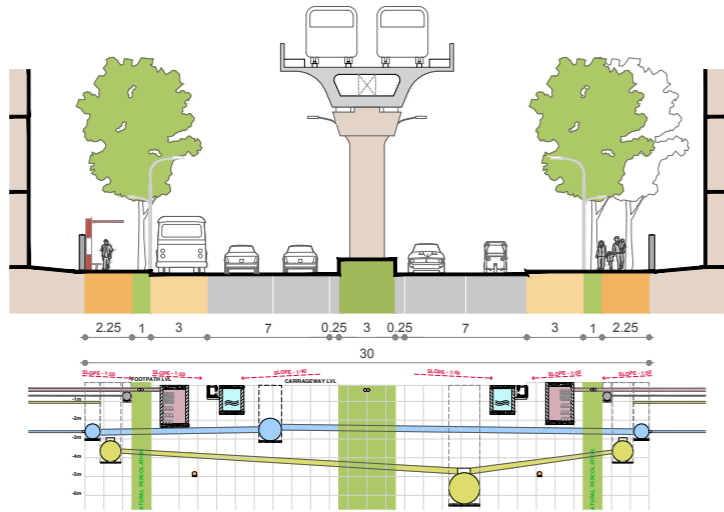
Sub-Arterial Road - 30m - Without Metro

3A



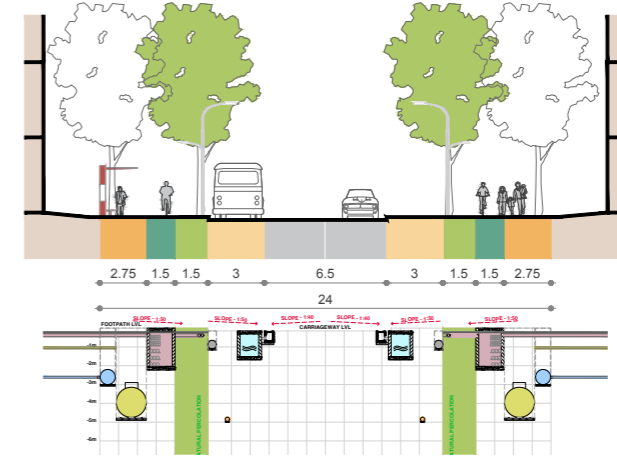
Collector Road - 24m - With 2 lanes

2C



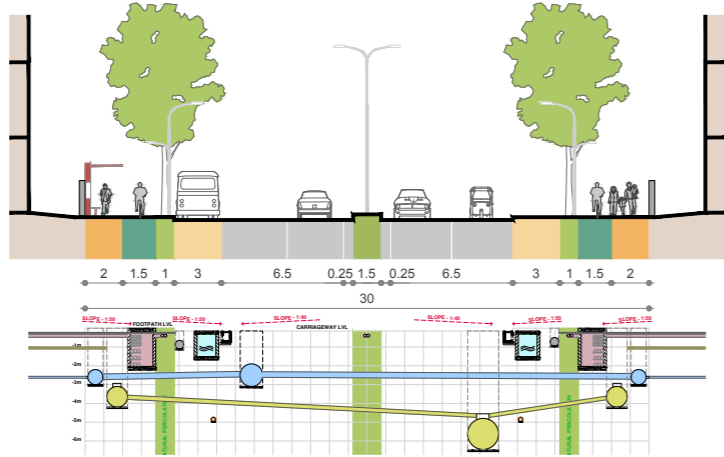
Sub-Arterial Road - 30m - With Metro

3B



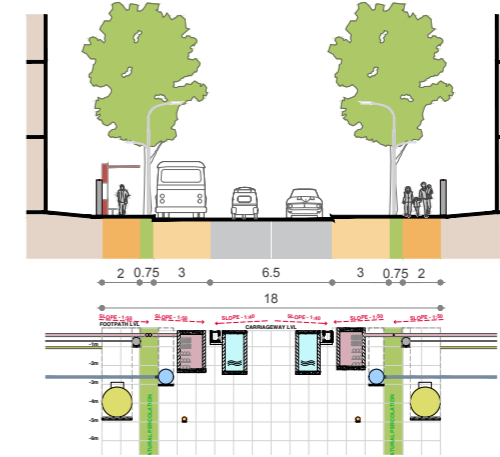
Collector Street - 24m - With 4 lanes

2E



Sub-Arterial Road - 30m - With Cycle Track

3C



Collector Street - 18m

5.4 Contextualising a Street Template

Standard street design templates provide a useful framework for street planning, but their effective application requires adaptation to on-ground realities. Variations in right-of-way, land use, user behaviour, and physical constraints must inform the design process. Contextualising templates ensures that proposed interventions are responsive to the existing street conditions, resulting in safer, more inclusive, and functional streetscapes.

Existing Condition - Scenario 1



Varying ROW

The RoW varies between 12-15 m and includes a central median. The absence of lane markings allows up to four lanes of traffic to flow informally, with the carriageway on each side of the median ranging from 6 to 7 m in width.



Absence of NMT Infrastructure

The street lacks footpaths. A 0.5 to 0.8 m wide storm water drain runs along the property edge at carriageway level, offering only a vague spatial cue for pedestrian use.



Property Ramps - an Obstruction to Footpath

In certain stretches, the storm water drain is laid at a slope, functioning as a ramp for property access. In other segments, it is interrupted by steps leading directly to residences, breaking pedestrian continuity.



High Informal Vendor Activities

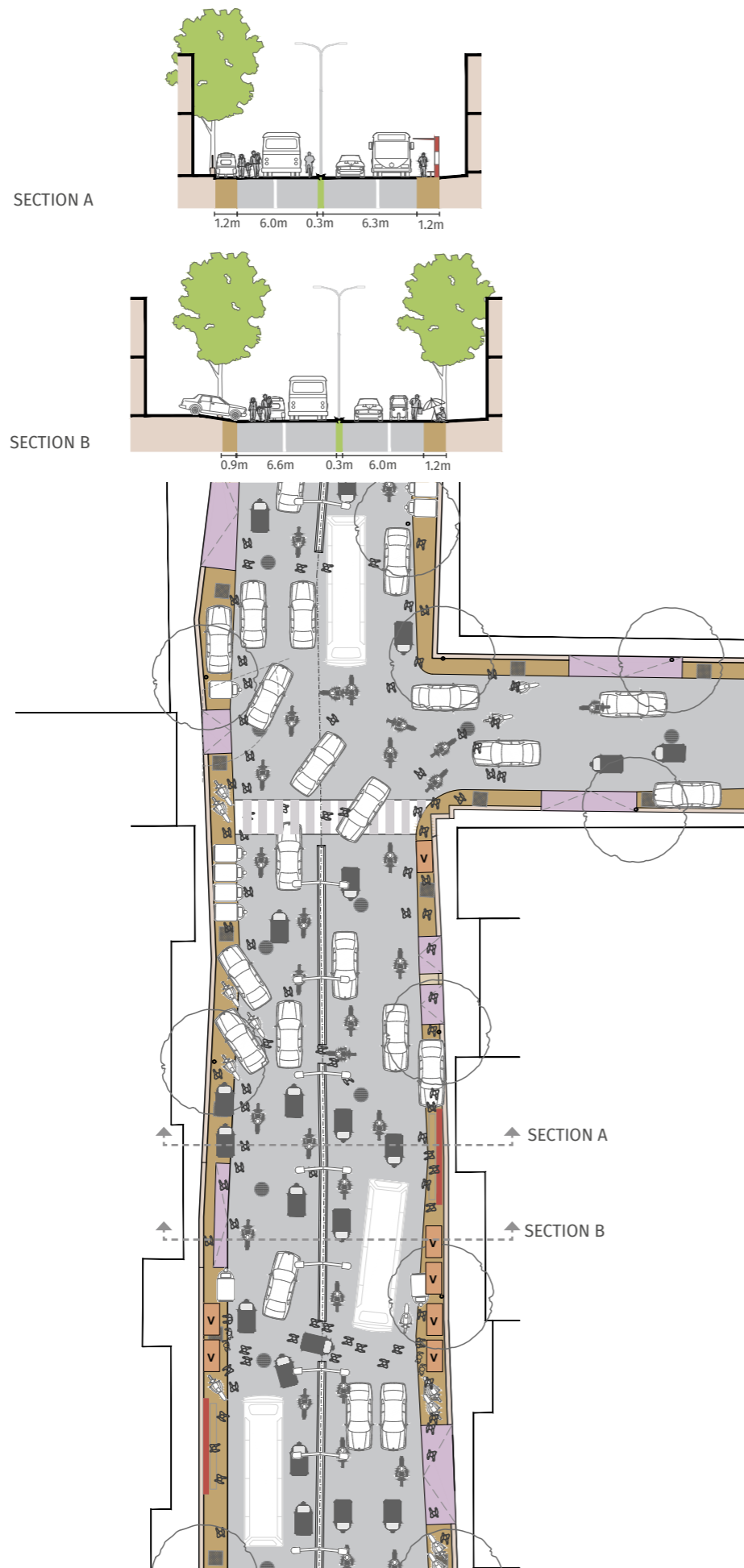
The street experiences high vending activity at different times of the day. With no designated vending zones, vendors spill onto the carriageway. This forces pedestrians to walk on the carriageway, putting them in direct conflict with fast-moving vehicles.



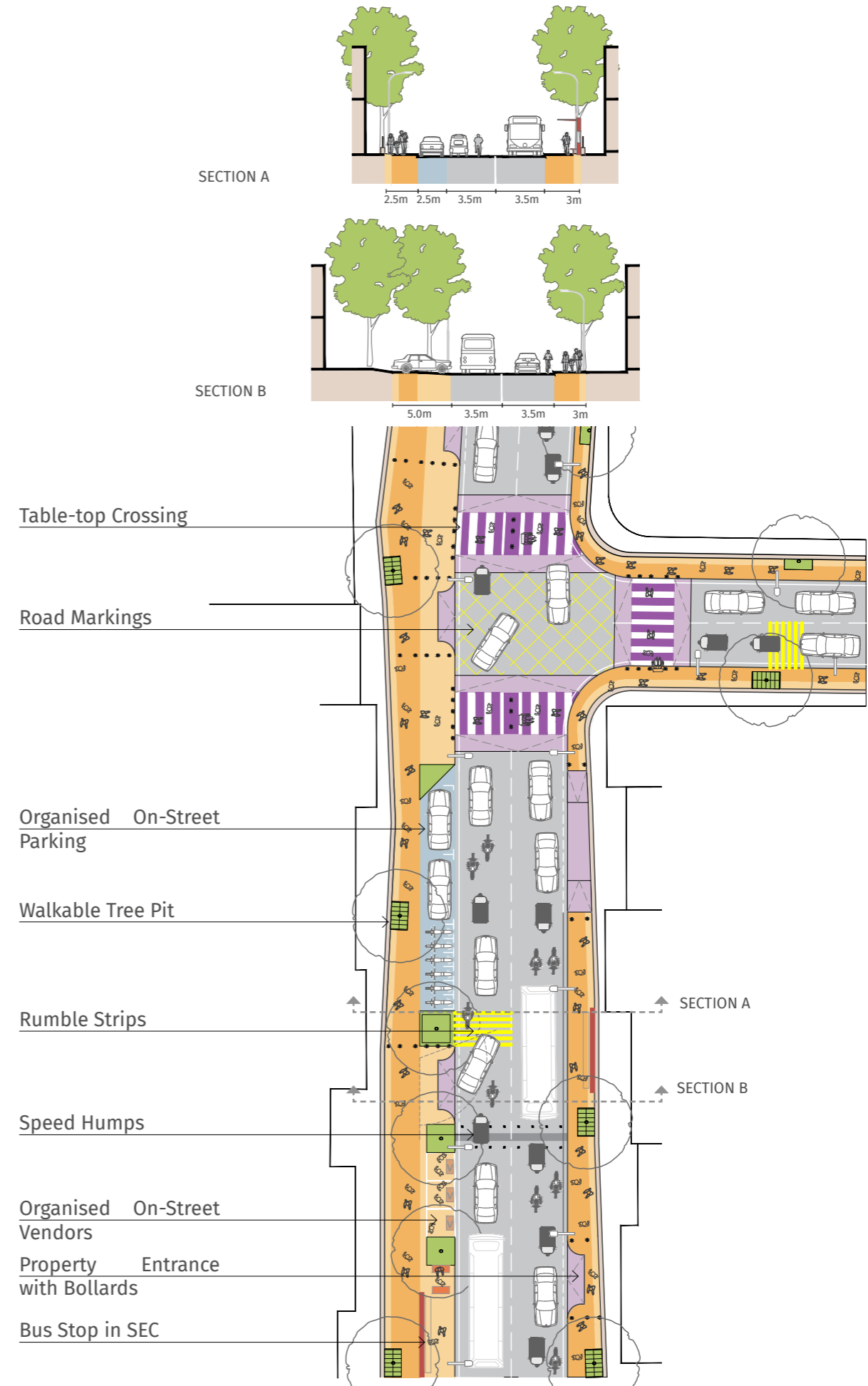
Haphazard Illegal Parking

Illegal parking is also common, especially in front of commercial units and vending areas, further reducing the available walking and vending space further increasing pedestrian-vehicle conflicts.

Existing Condition

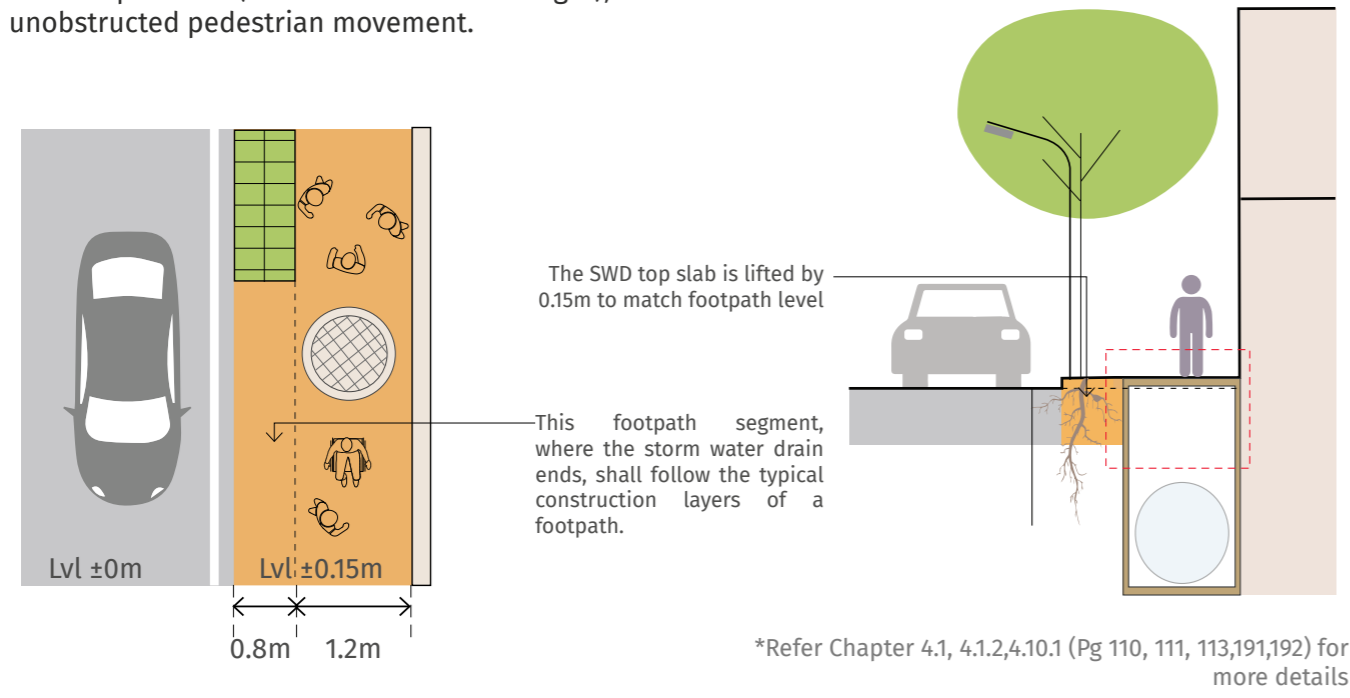


Proposed Solution



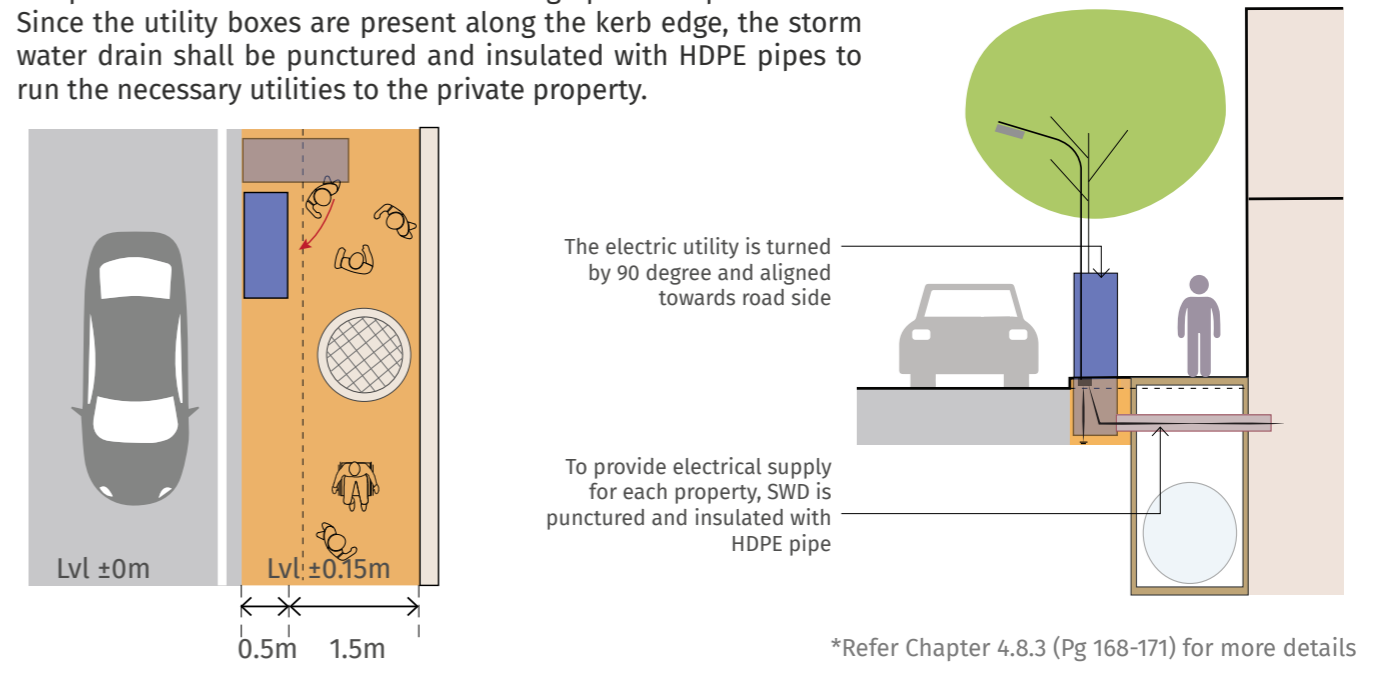
Ensuring a min of 2m continuous footpath

If a tree is present along the kerb edge, a walkable tree pit shall be provided (0.8m width and 1.2m length), to ensure unobstructed pedestrian movement.

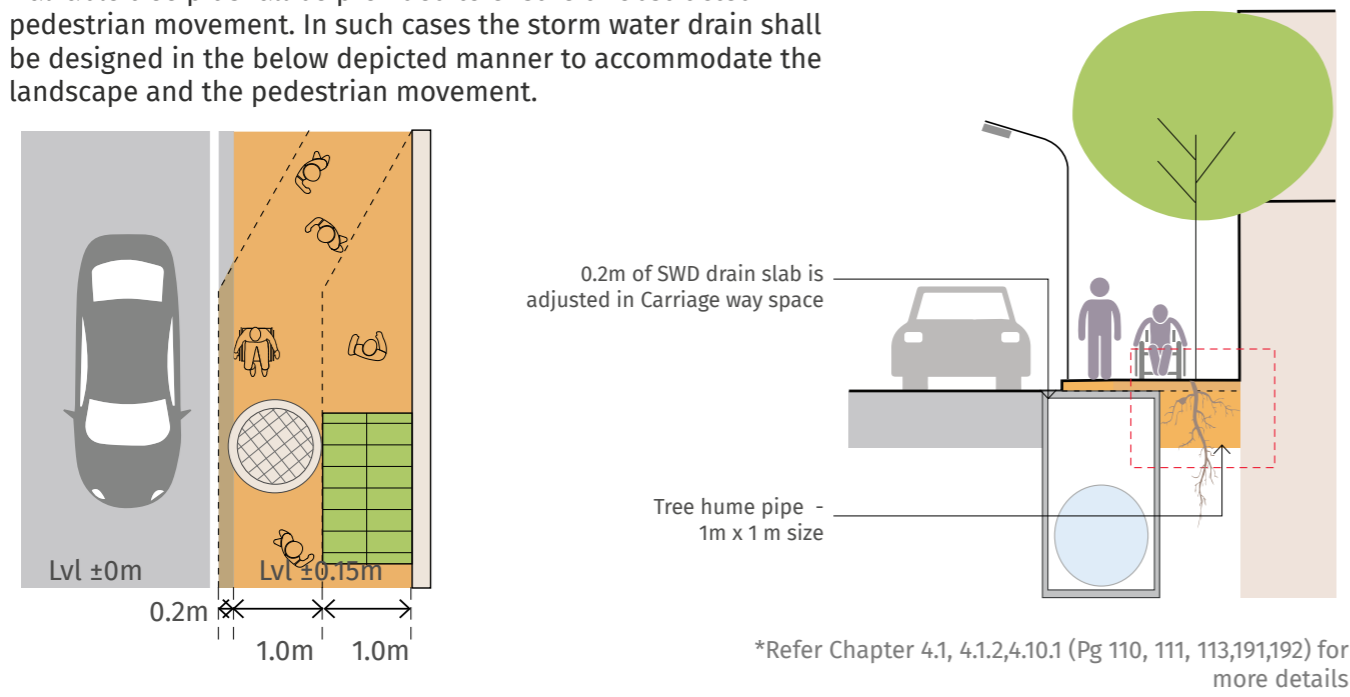


Above-Ground Utility Strategies

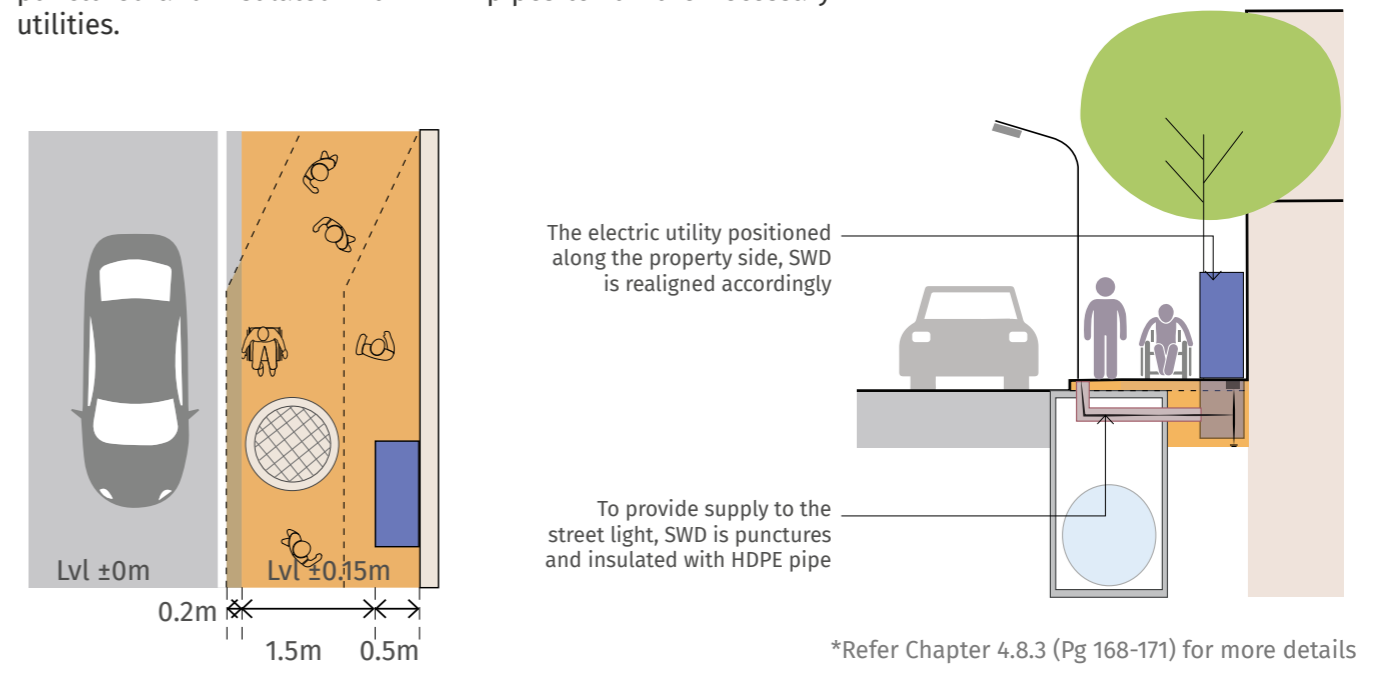
In the proposed scenario, the utility boxes are made parallel to the footpath in order to ensure clear walking space for pedestrians. Since the utility boxes are present along the kerb edge, the storm water drain shall be punctured and insulated with HDPE pipes to run the necessary utilities to the private property.



In cases where the tree is present along the property edge, a walkable tree pit shall be provided to ensure unobstructed pedestrian movement. In such cases the storm water drain shall be designed in the below depicted manner to accommodate the landscape and the pedestrian movement.

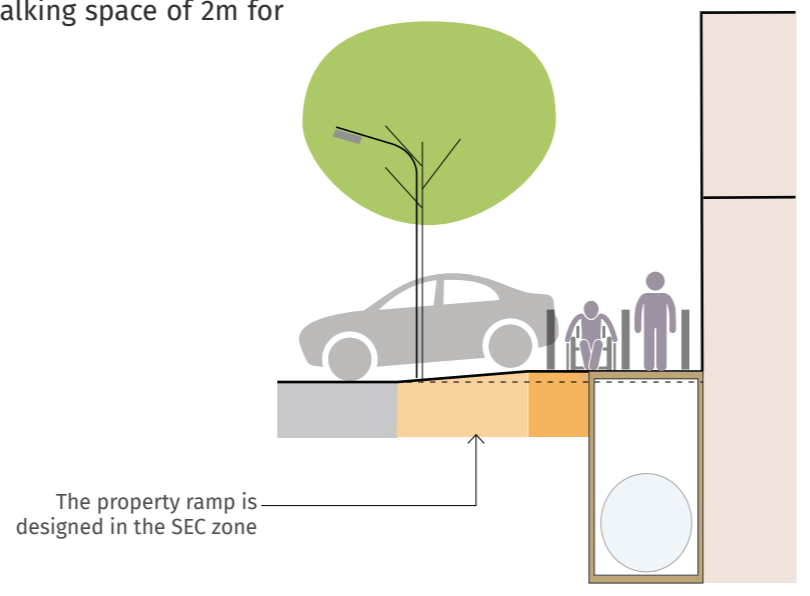
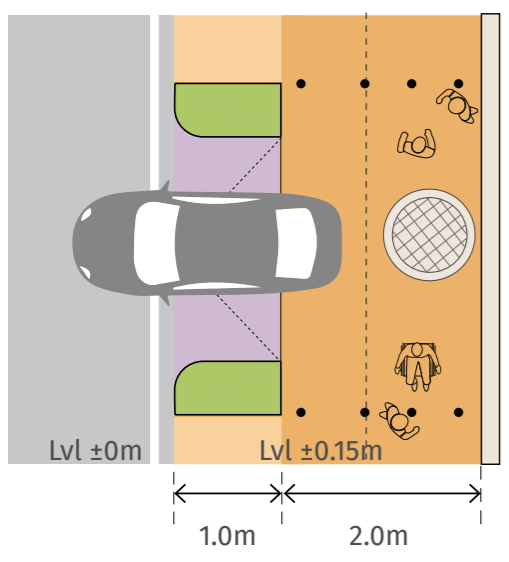


In the proposed scenario, the storm water drain shall be punctured and insulated with HDPE pipes to run the necessary utilities.



Property Access Ramps

Property access ramps shall be provided wherever necessary. In this instance, due to the availability of space, the property ramp is provided in the SEC, ensuring a clear walking space of 2m for pedestrians.

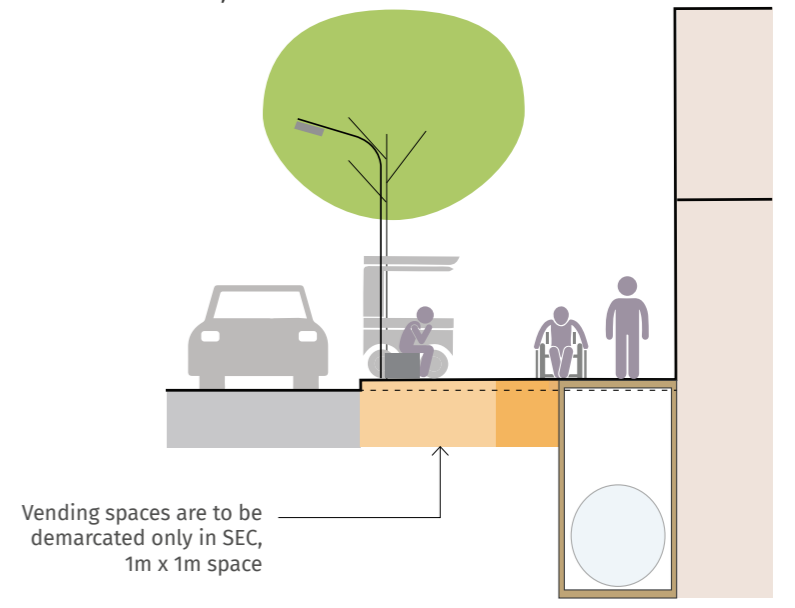
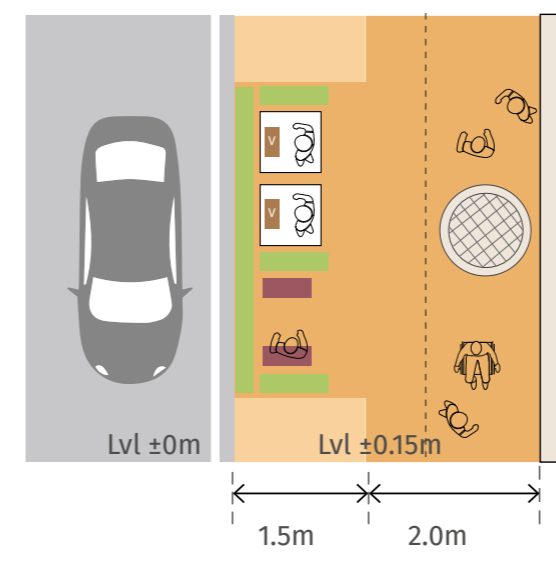


The property ramp is designed in the SEC zone

*Refer Chapter 4.1.4,4.1.5 (Pg 113-114) for more details

Accommodating Vending and Parking in SEC

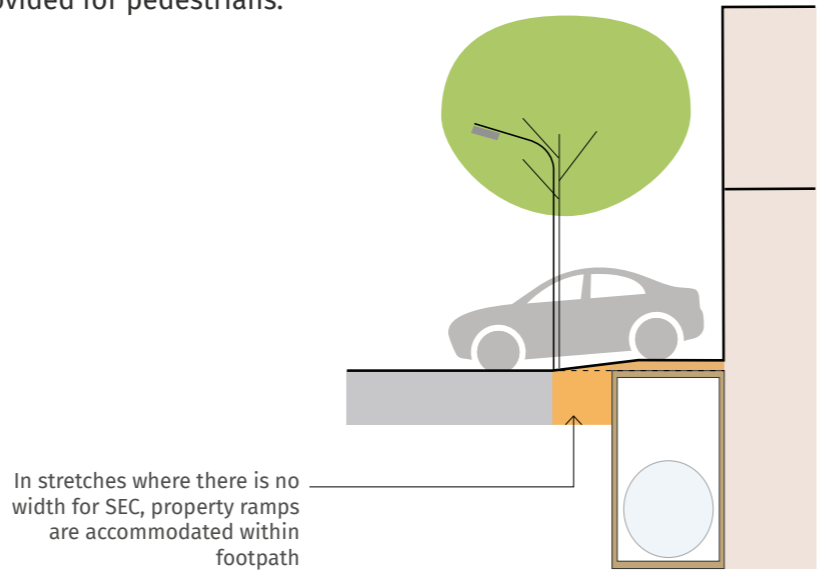
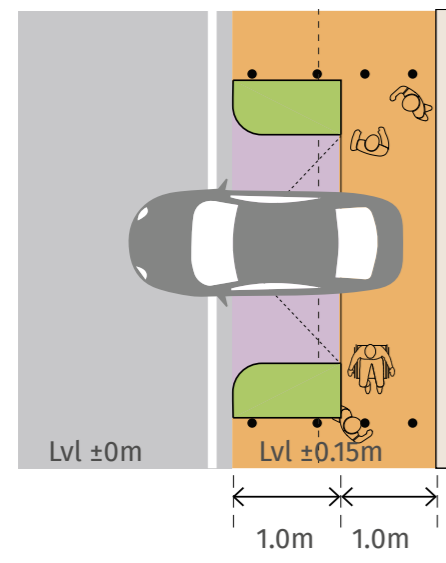
Vending spaces shall be provided only in the SEC, to ensure clear walking space for pedestrians. In the absence of SEC, vending spaces shall not be provided.



Vending spaces are to be demarcated only in SEC, 1m x 1m space

*Refer Chapter 4.8.5 (Pg 174) for more details

In the absence of a SEC (due to lack of space), the property ramp shall be accounted within the private property. In instances where this is not possible, the ramps are accounted for within the walking space. While this is not an ideal scenario, care must be taken to ensure that walking space is provided for pedestrians.

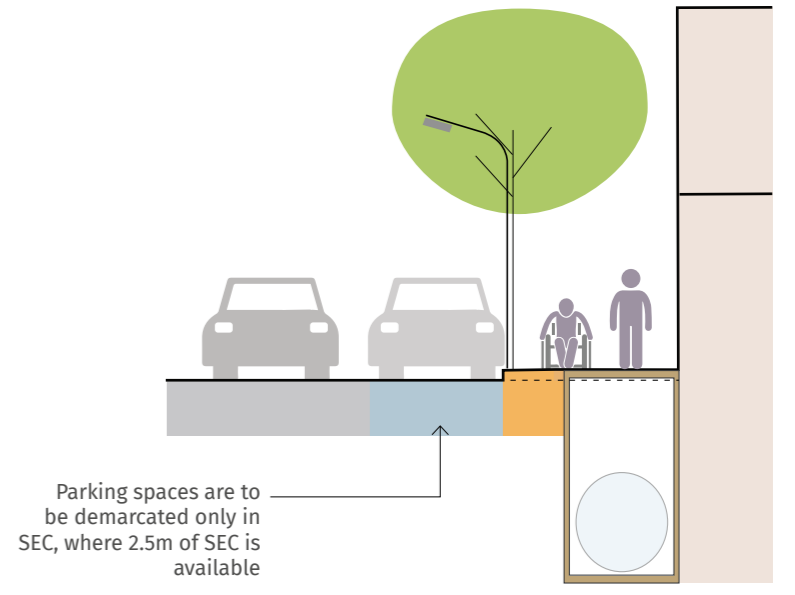
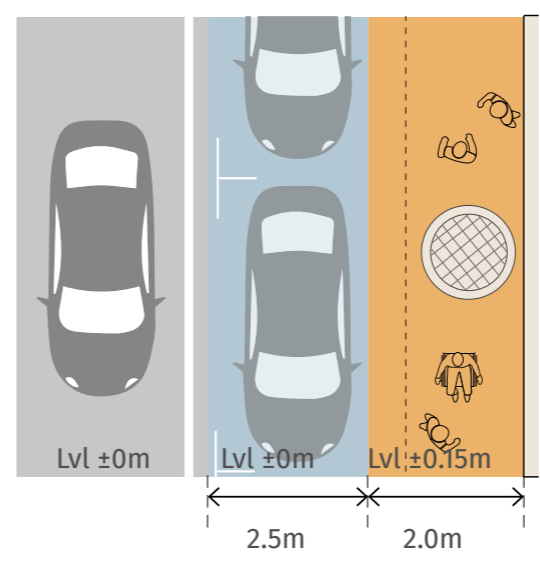


In stretches where there is no width for SEC, property ramps are accommodated within footpath

*Refer Chapter 4.1.4,4.1.5 (Pg 113-114) for more details

Refer scenario 2 for other design solutions for ramp treatment.

Parking shall be provided only in the SEC, to ensure clear walking space for pedestrians. In the absence of SEC, parking shall not be provided. In cases where limited space is available for the SEC, parallel parking orientation shall be provided, without compromising on pedestrian walking space.

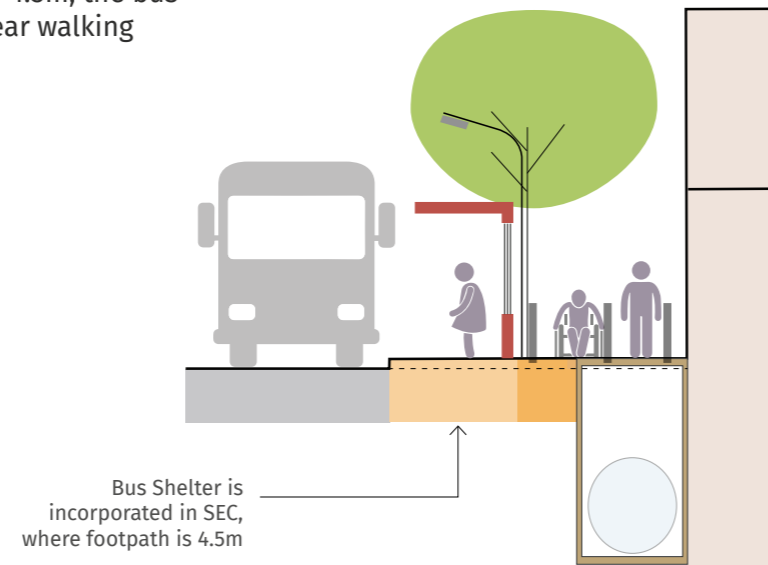
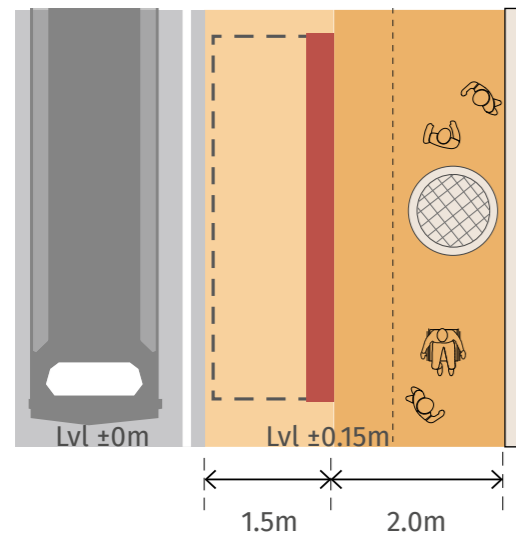


Parking spaces are to be demarcated only in SEC, where 2.5m of SEC is available

*Refer Chapter 4.8.1 (Pg 154-157) for more details

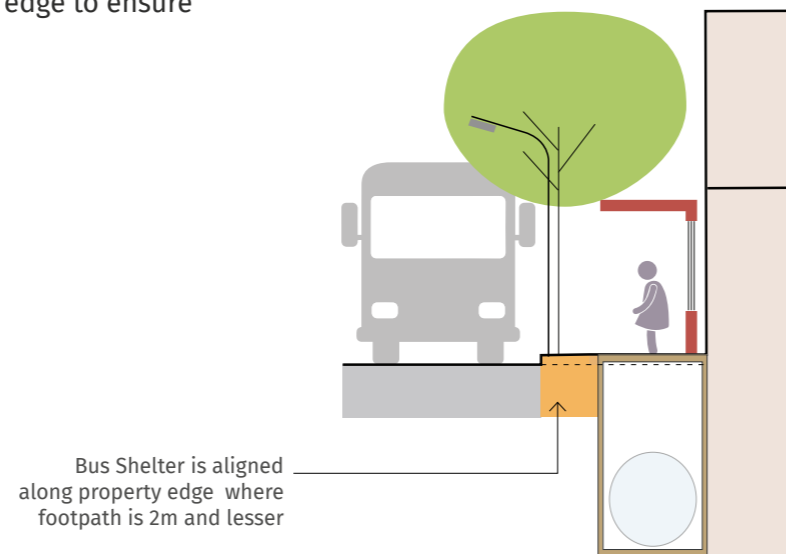
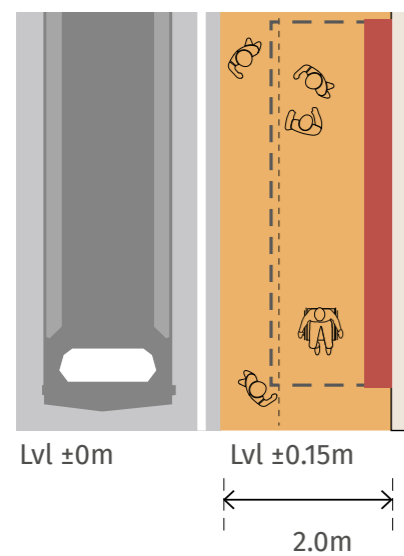
Incorporating Bus Shelter with streets

In locations where the space for footpaths >4.5m, the bus stop shall be provided in the SEC, with a clear walking space behind the bus stop.



*Refer Chapter 4.8.2 (Pg 162-167) for more details

In locations where the space for footpaths <4.5m, the bus stop shall be provided along the property edge to ensure sufficient walking space for pedestrians.



*Refer Chapter 4.8.2 (Pg 162-167) for more details



Existing Condition - Scenario 2



Lack of Street Space Demarcation

The street has a RoW of 12 m. The carriageway typically accommodates two lanes of traffic but lacks centerline markings. On-street parking is common, especially in front of commercial establishments. The street is predominantly commercial with some residences in between.



Pedestrian Inaccessibility Concerns

There are no footpaths. A 0.5 to 0.8 m wide storm water drain runs along the property edge at a height of 0.6 to 1 m above the carriageway. This elevation makes it difficult for pedestrians to use the drain as a walking space, despite the drain offering segregation from traffic.



Grand Southern Trunk Road, Pallavaram Source: ITDP India



Property Ramps - an Obstruction to Footpath

In certain stretches, the storm water drain is laid at a slope, functioning as a ramp for property access. In other segments, it is interrupted by steps leading directly to residences, breaking pedestrian continuity.



Absence of NMT infrastructure

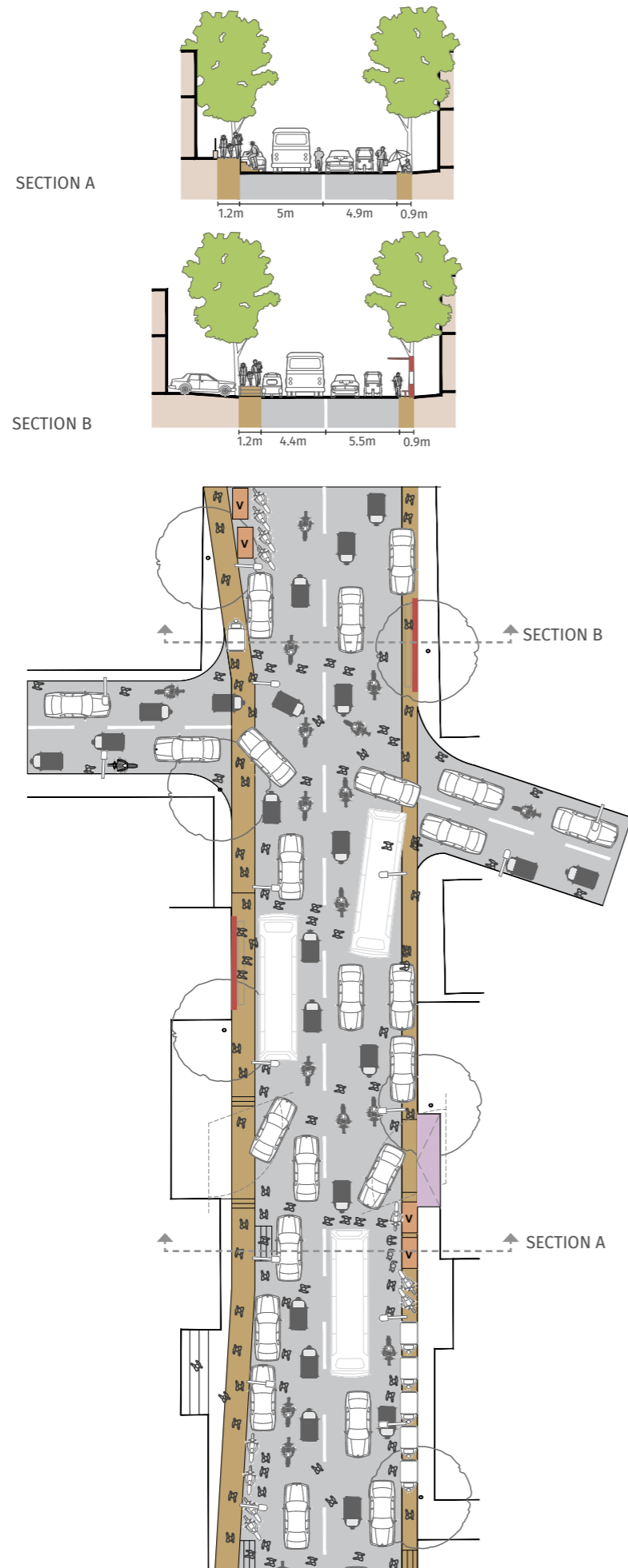
In some segments, neither footpaths nor drains are present. Pedestrian access to shops is directly from the carriageway via steps or ramps, reducing the already limited walking space and causing frequent encroachments.



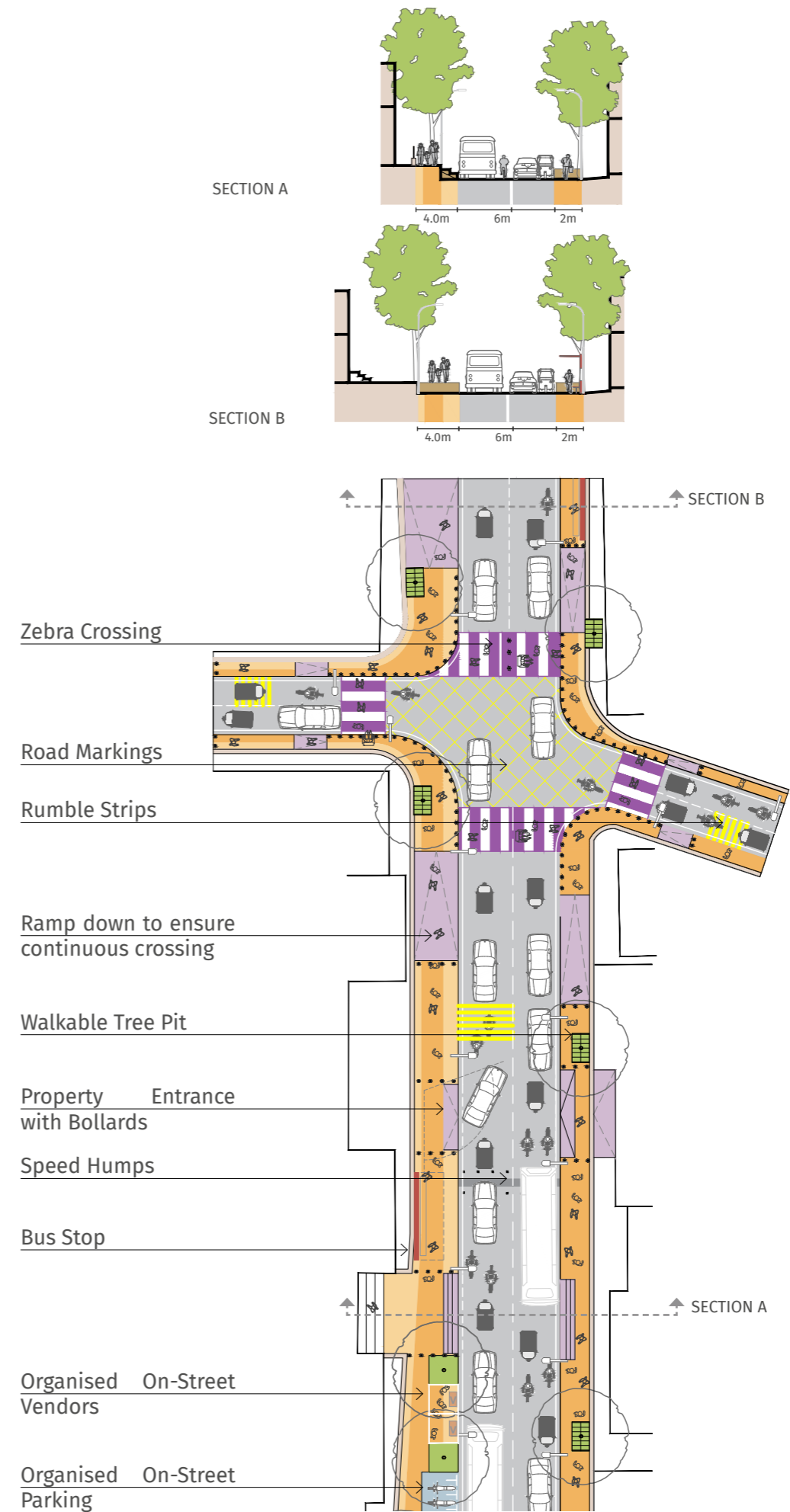
High Storm Water Drains

Where the 1 m high storm water drain exists, accessing stores requires two sets of steps—one over the drain and another into the shop. Store signage and equipment often encroach upon both the drain and carriageway, severely limiting pedestrian movement.

Existing Condition



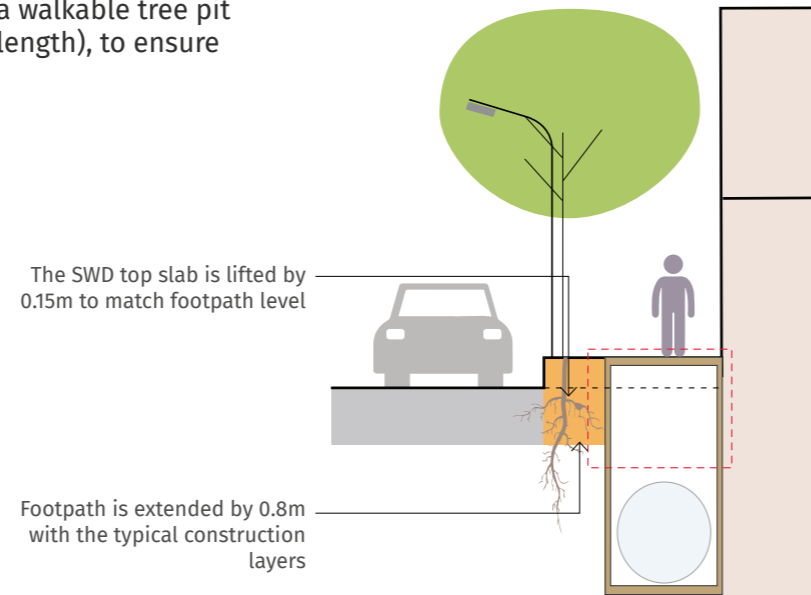
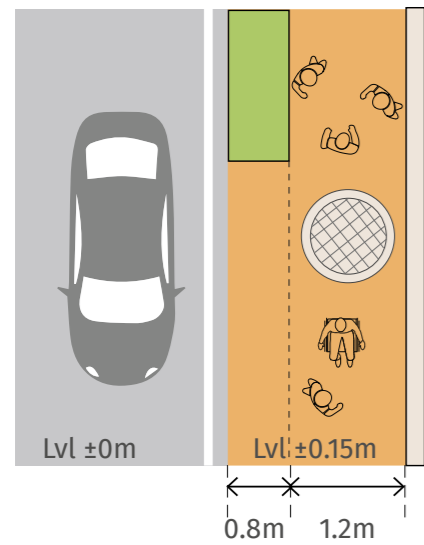
Proposed Solution



Note: Storm water drains shall be designed with a finished top height of 0.15 meters. The required carrying capacity must be planned accordingly within this height constraint. The solutions provided under Scenario 2 apply only in cases where the top slab height of the storm water drain cannot be reduced. If the storm water drain height can be limited to 0.15 meters, please refer to Scenario 1 for appropriate contextual solutions.

Ensuring a min of 2m continuous footpath

If a tree is present along the kerb edge, a walkable tree pit shall be provided (0.8m width and 1.2m length), to ensure unobstructed pedestrian movement.

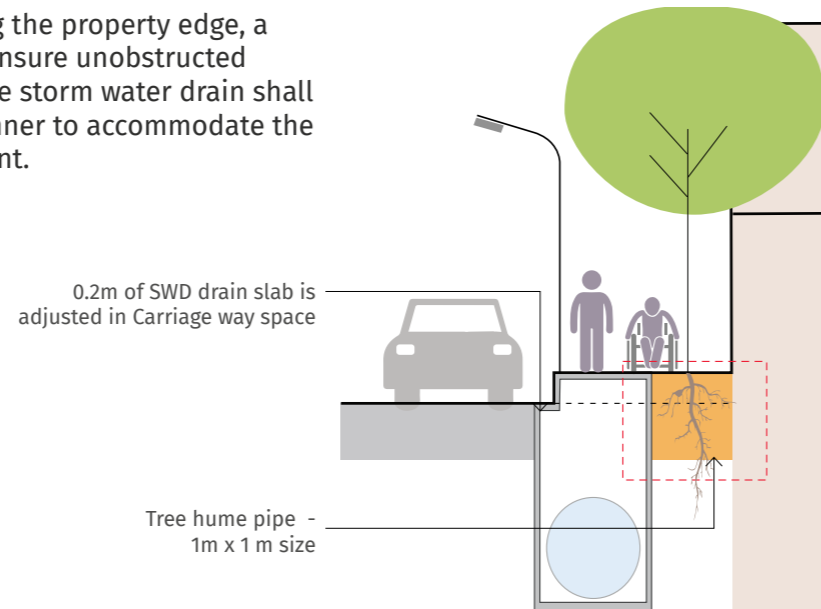
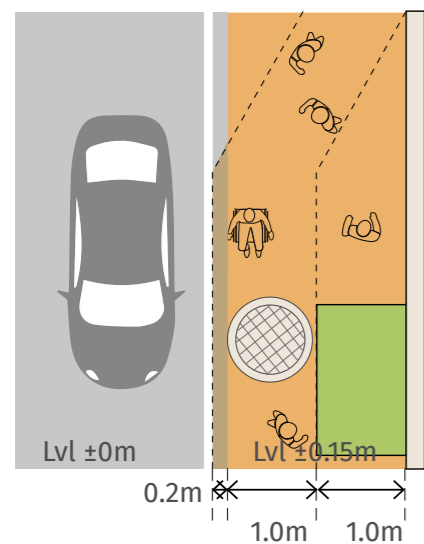


The SWD top slab is lifted by 0.15m to match footpath level

Footpath is extended by 0.8m with the typical construction layers

*Refer Chapter 4.1, 4.1.2,4.10.1 (Pg 110, 111, 113,191,192) for more details

In cases where the tree is present along the property edge, a walkable tree pit shall be provided to ensure unobstructed pedestrian movement. In such cases the storm water drain shall be designed in the below depicted manner to accommodate the landscape and the pedestrian movement.



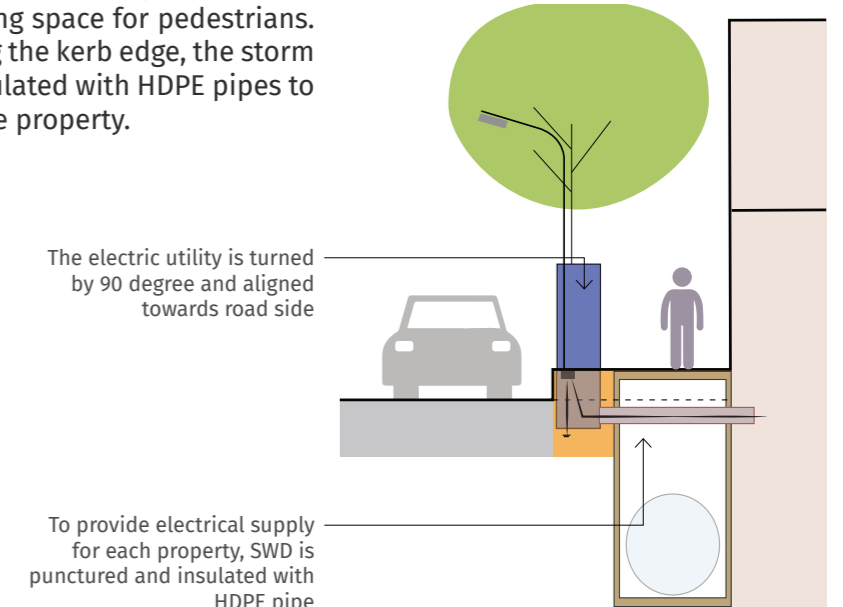
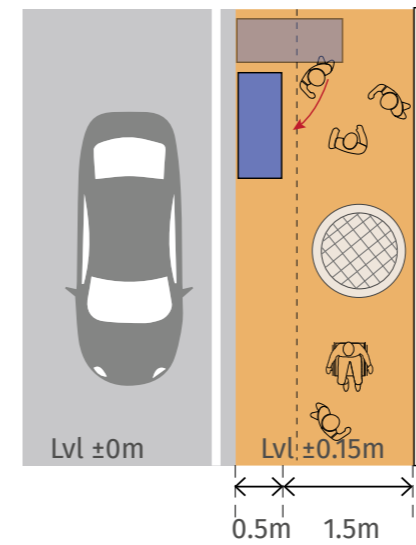
0.2m of SWD drain slab is adjusted in Carriage way space

Tree hume pipe - 1m x 1m size

*Refer Chapter 4.1, 4.1.2,4.10.1 (Pg 110, 111, 113,191,192) for more details

Above-Ground Utility Strategies

In the proposed scenario, the utility boxes are made parallel to the footpath in order to ensure clear walking space for pedestrians. Since the utility boxes are present along the kerb edge, the storm water drain shall be punctured and insulated with HDPE pipes to run the necessary utilities to the private property.

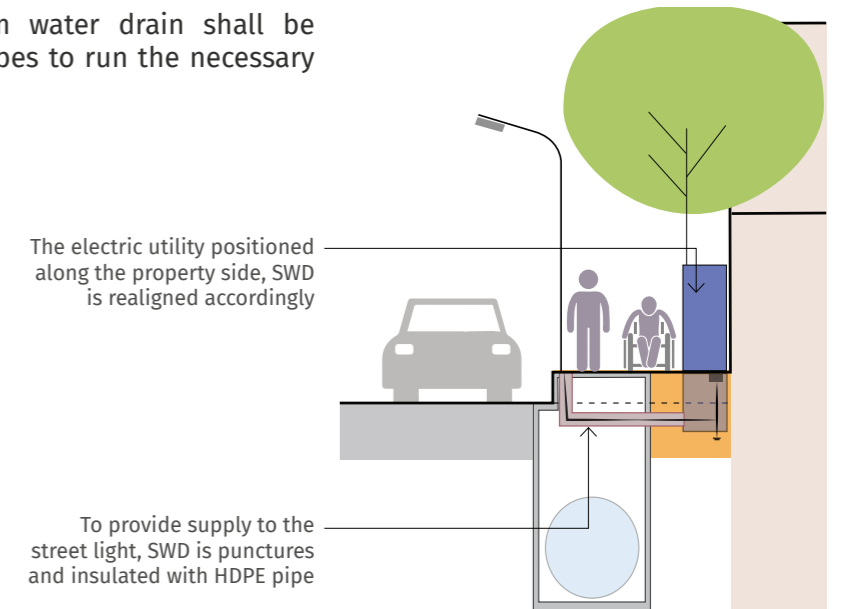
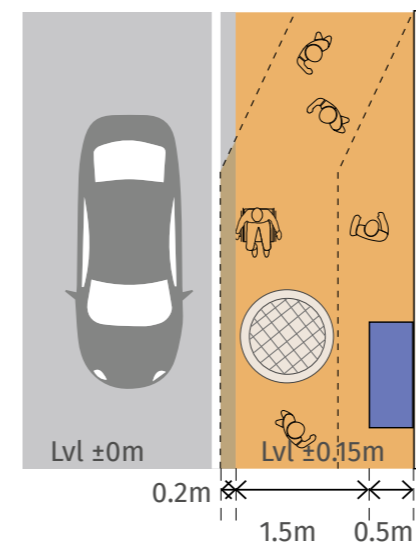


The electric utility is turned by 90 degree and aligned towards road side

To provide electrical supply for each property, SWD is punctured and insulated with HDPE pipe

*Refer Chapter 4.8.3 (Pg 168-171) for more details

In the proposed scenario, the storm water drain shall be punctured and insulated with HDPE pipes to run the necessary utilities.



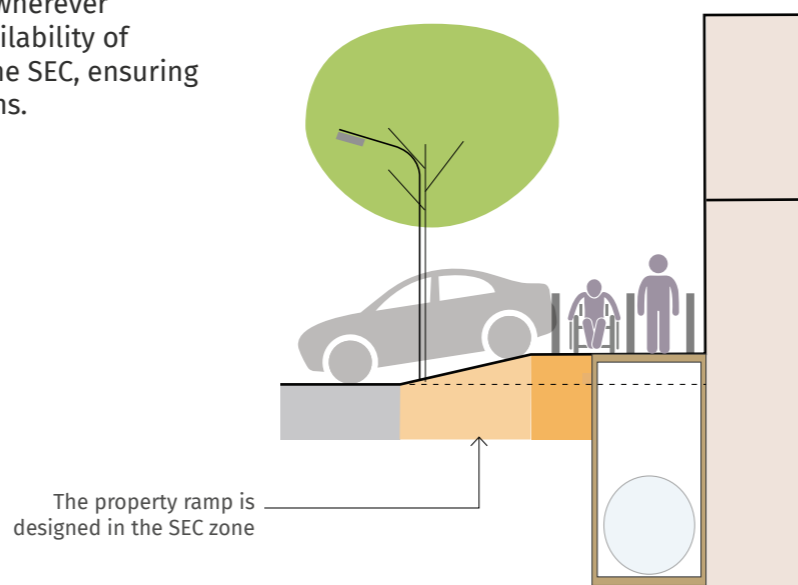
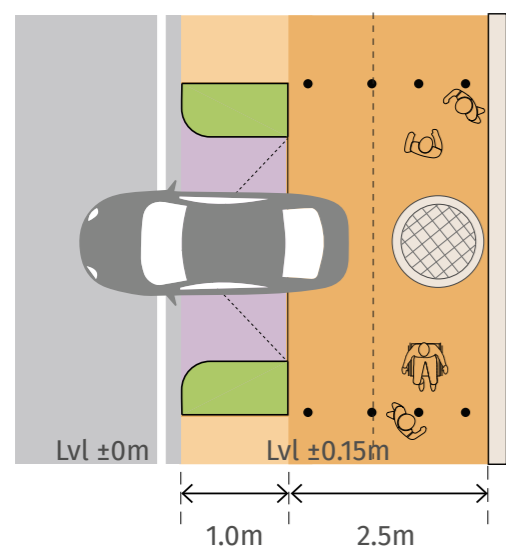
The electric utility positioned along the property side, SWD is realigned accordingly

To provide supply to the street light, SWD is punctures and insulated with HDPE pipe

*Refer Chapter 4.8.3 (Pg 168-171) for more details

Property Access Vehicular Ramps

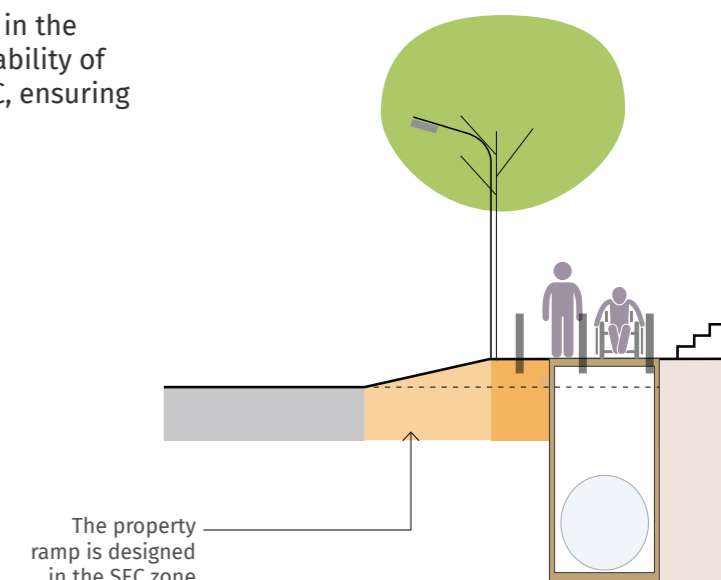
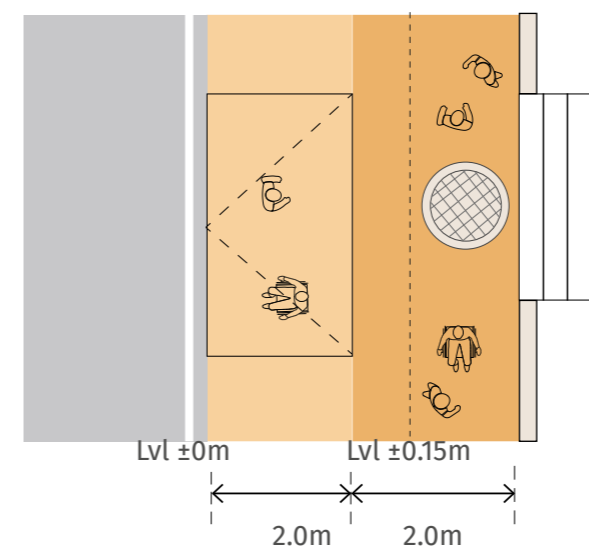
Property access ramps shall be provided wherever necessary. In this instance, due to the availability of space, the property ramp is provided in the SEC, ensuring a clear walking space of 2m for pedestrians.



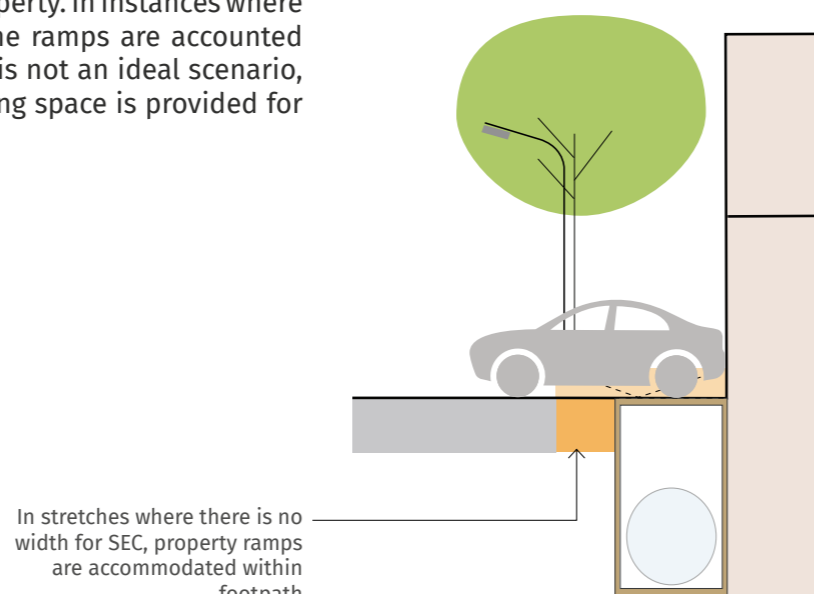
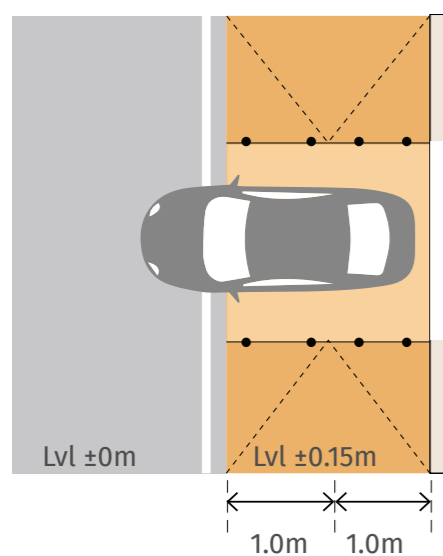
*Refer Chapter 4.1.4,4.1.5 (Pg 113-114) for more details

Property Access Pedestrian Stepped Entry

Access to the property shall be accommodated in the private space. In this instance, due to the availability of space, the property ramp is provided in the SEC, ensuring a clear walking space of 2m for pedestrians.

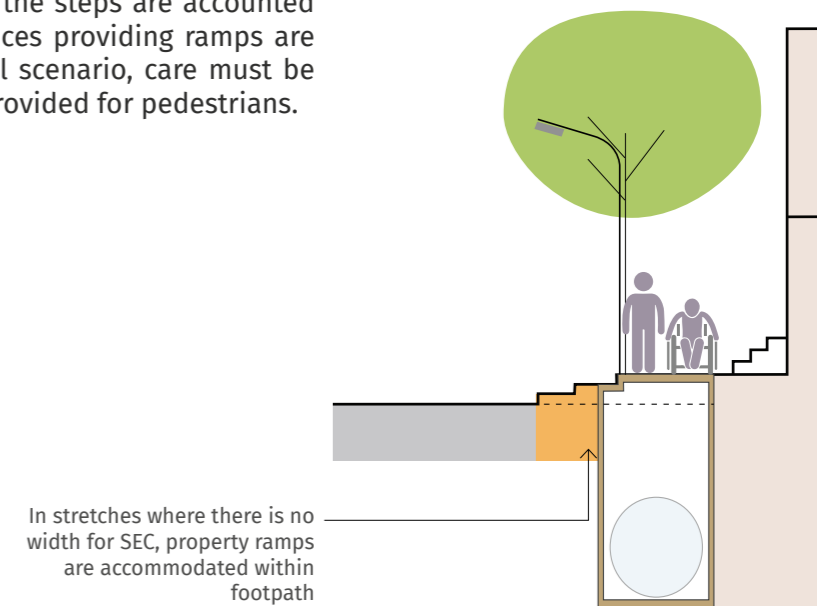
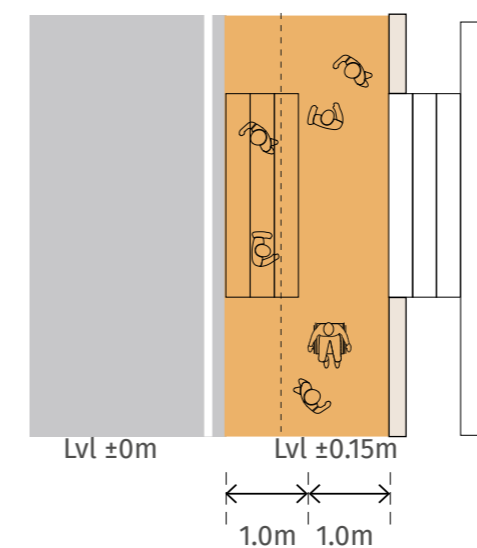


In the absence of a SEC (due to lack of space), the property ramp shall be accounted within the private property. In instances where this is not possible, as shown below, the ramps are accounted for within the walking space. While this is not an ideal scenario, care must be taken to ensure that walking space is provided for pedestrians.



*Refer Chapter 4.1.4,4.1.5 (Pg 113-114) for more details

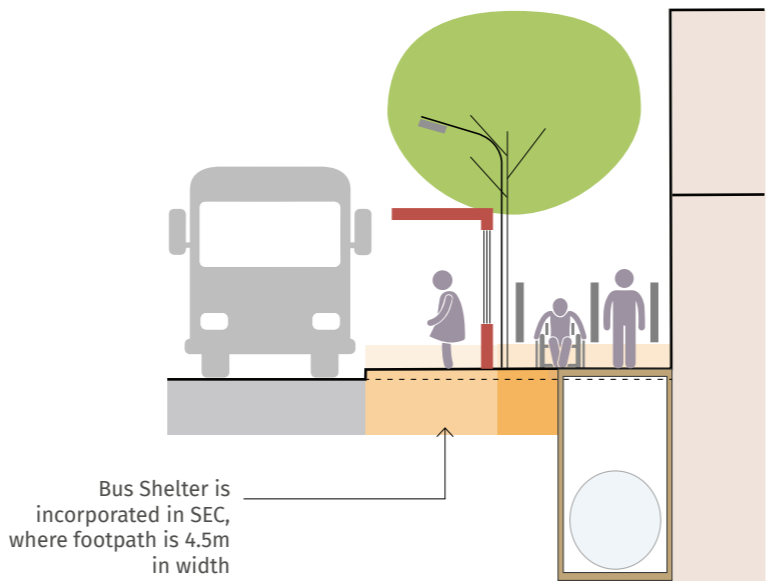
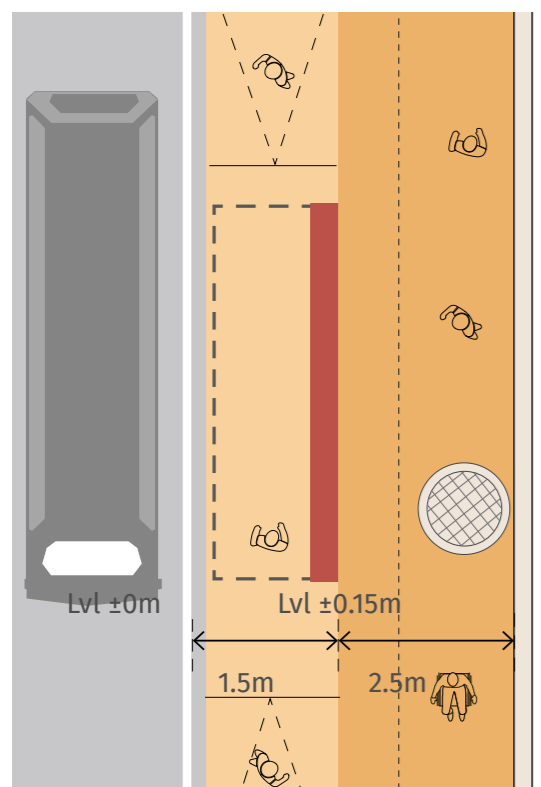
In the absence of a SEC (due to lack of space), the stepped access to the footpath shall be provided and the steps are accounted for within the walking space. In instances providing ramps are not possible. While this is not an ideal scenario, care must be taken to ensure that walking space is provided for pedestrians.



In stretches where there is no width for SEC, property ramps are accommodated within footpath

Incorporating Bus Shelter with streets

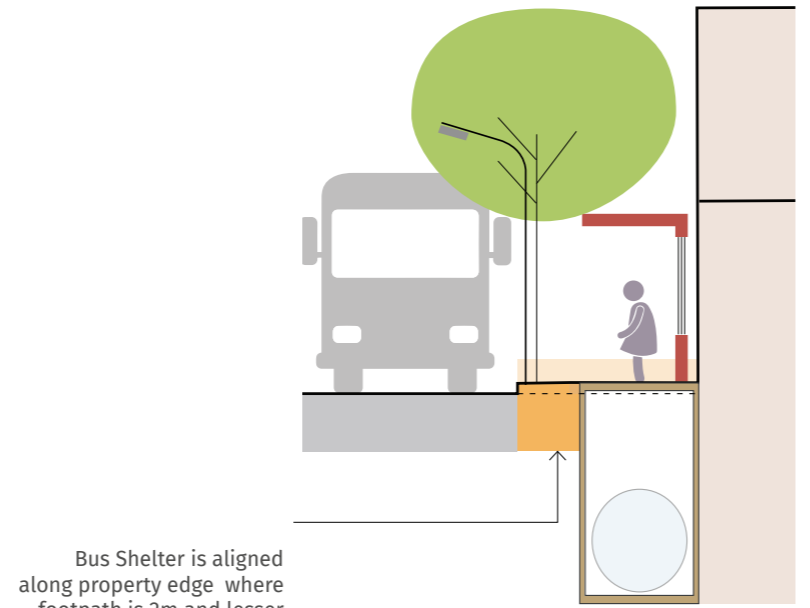
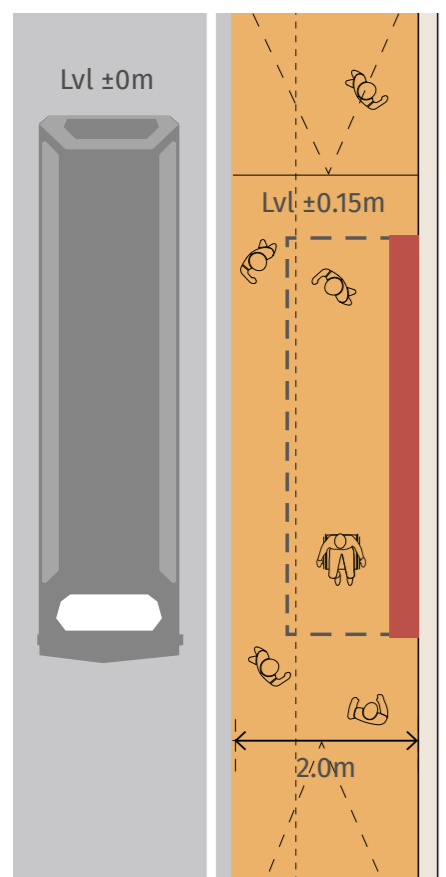
In locations where the space for footpaths >4.5m, the bus stop shall be provided in the SEC, with a clear walking space behind the bus stop.



Bus Shelter is incorporated in SEC, where footpath is 4.5m in width

*Refer Chapter 4.8.2 (Pg 162-167) for more details

In locations where the space for footpaths <4.5m, the bus stop shall be provided along the property edge to ensure sufficient walking space for pedestrians.

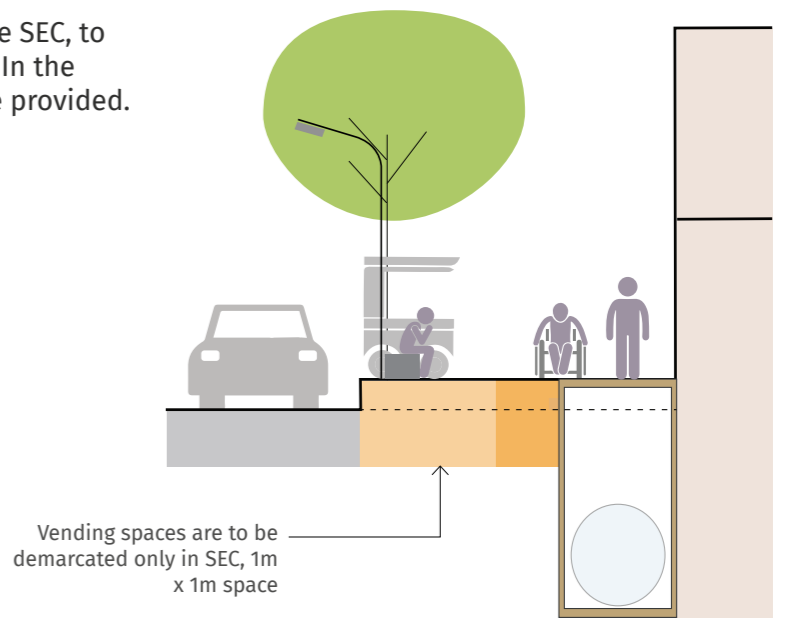
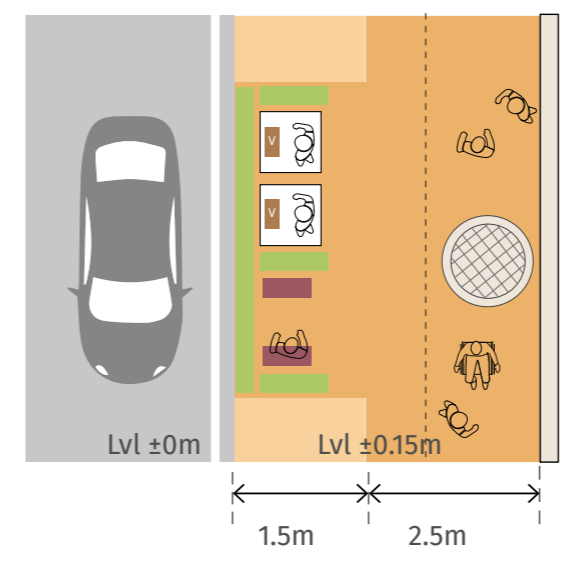


Bus Shelter is aligned along property edge where footpath is 2m and lesser

*Refer Chapter 4.8.2 (Pg 162-167) for more details

Accommodating Vending and Parking in SEC

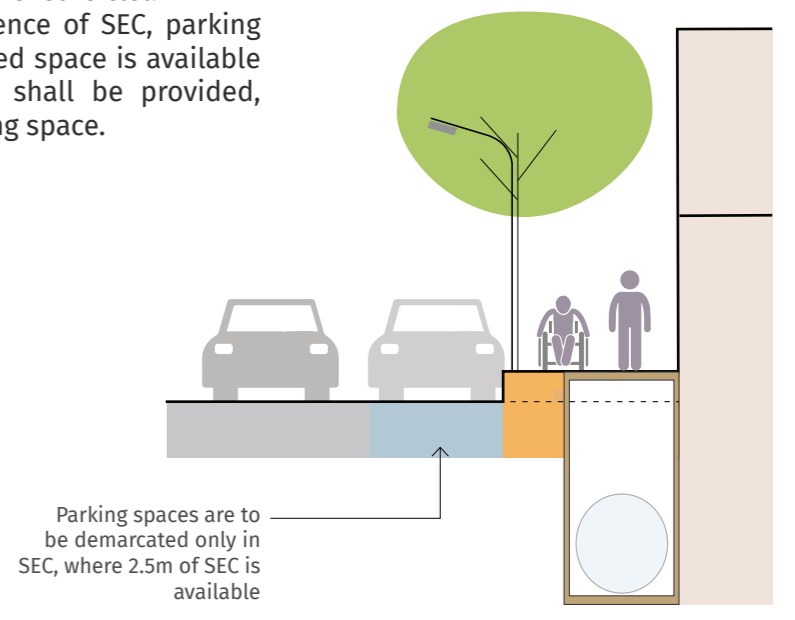
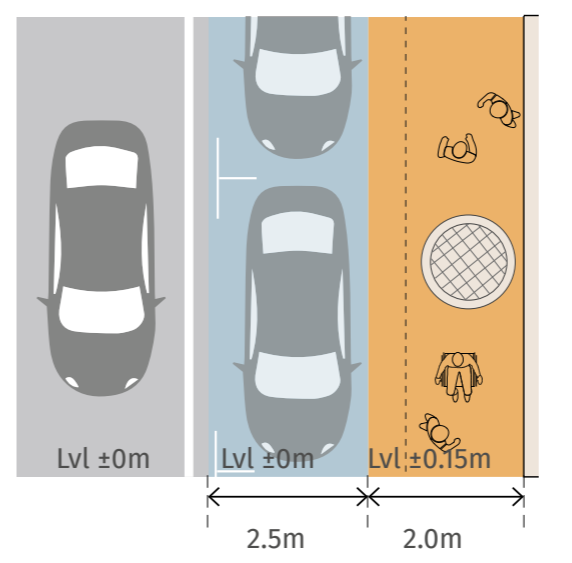
Vending spaces shall be provided only in the SEC, to ensure clear walking space for pedestrians. In the absence of SEC, vending spaces shall not be provided.



Vending spaces are to be demarcated only in SEC, 1m x 1m space

*Refer Chapter 4.8.5 (Pg 174) for more details

Parking shall be provided only in the SEC, to ensure clear walking space for pedestrians. In the absence of SEC, parking shall not be provided. In cases where limited space is available for the SEC, parallel parking orientation shall be provided, without compromising on pedestrian walking space.



Parking spaces are to be demarcated only in SEC, where 2.5m of SEC is available

*Refer Chapter 4.8.1 (Pg 154-157) for more details

Existing Condition - Scenario 3



Lack of pedestrian space

The street includes a flyover, with a 1 m wide footpath provided on either side at ground level for pedestrian access. The narrow width makes it difficult for pedestrians to walk side by side and is especially restrictive for persons with disabilities.



Encroached Below-the-Flyover Spaces

The space beneath the flyover is primarily used for vehicular U-turns and parking. This often results in chaotic traffic movement and congestion on either side of the flyover, making the environment below unsafe and uncomfortable for pedestrians, especially when crossing.



Grand Southern Trunk Road, Pallavaram Source: ITDP India



Commercial Spillover on Footpath

The already limited footpath is frequently encroached upon by shops and vending activities, forcing pedestrians to step onto the carriageway and navigate through traffic.



Undesigned Junctions Under the Flyovers

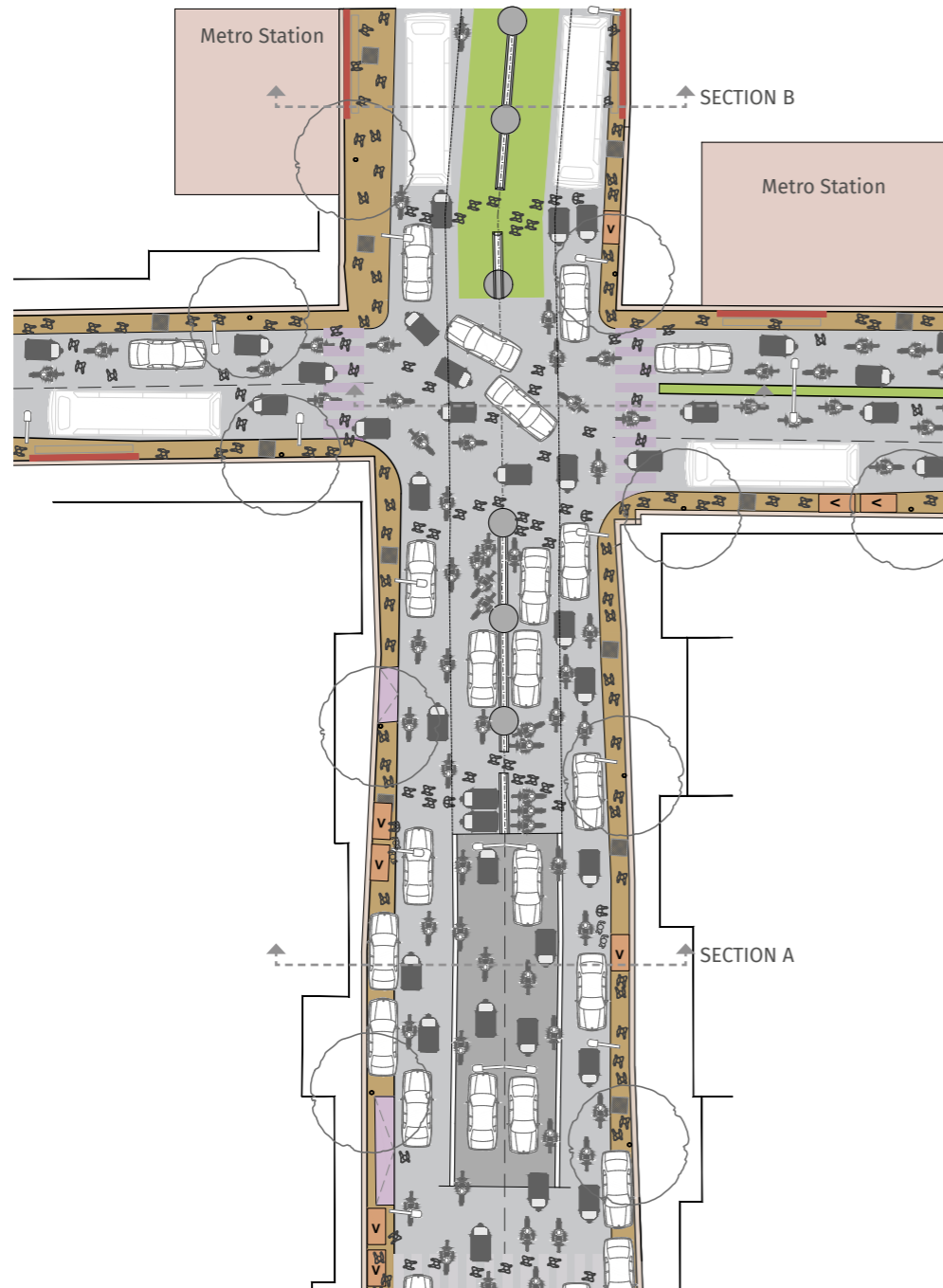
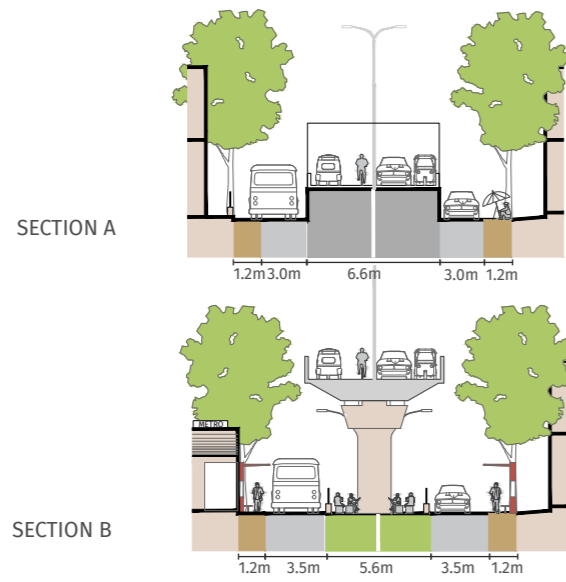
A four-arm junction lies beneath the flyover. One of the perpendicular arms includes a central median but lacks pedestrian refuge islands. This makes street crossing difficult and unsafe, particularly during peak traffic hours.



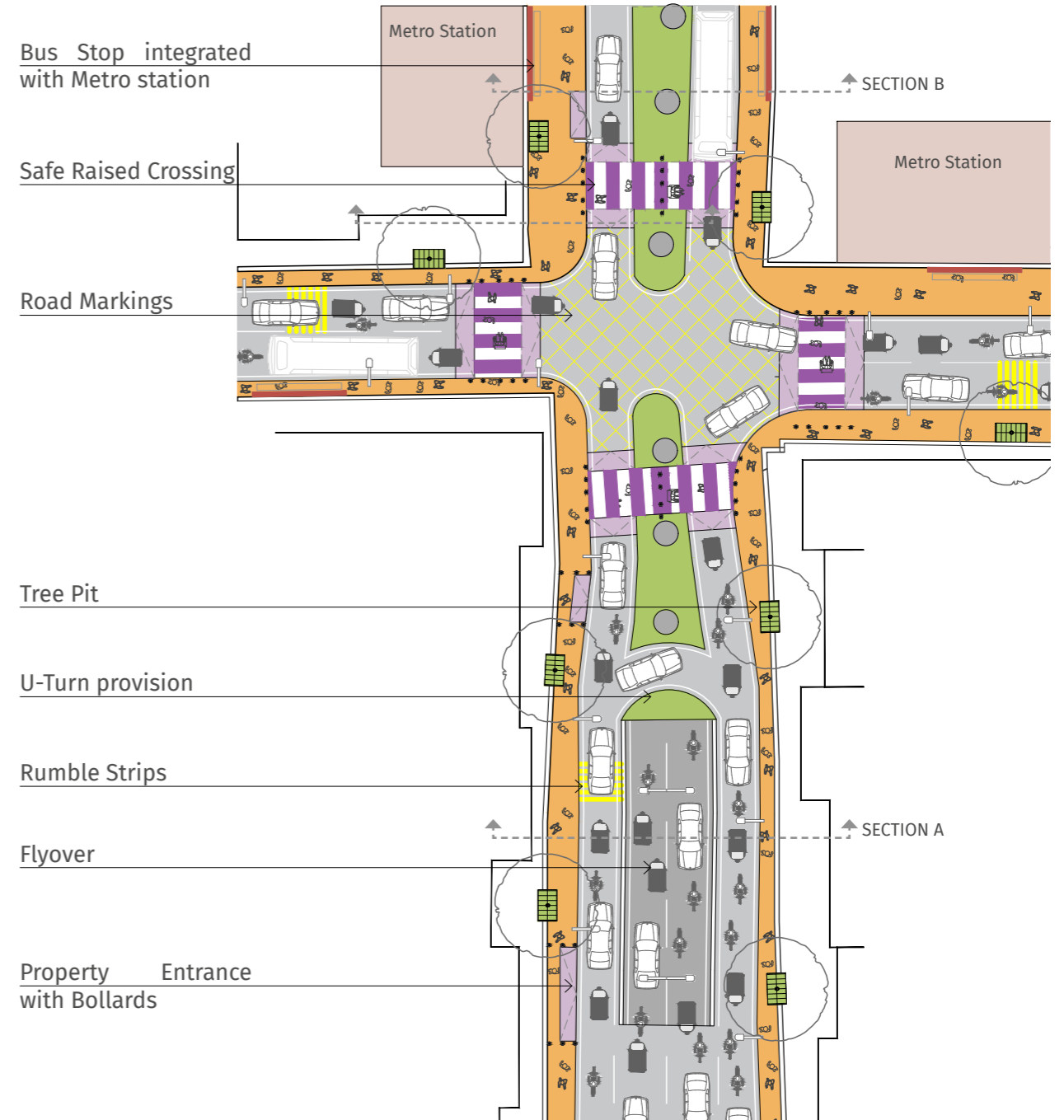
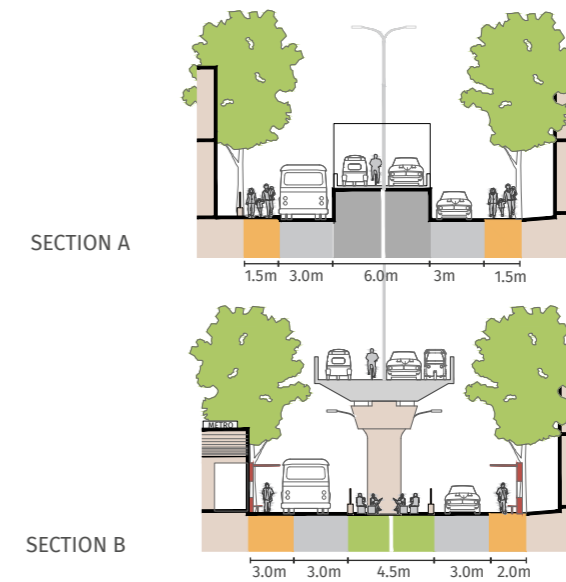
Unsafe First and Last Mile Access

An under-ground metro station is located adjacent to the flyover. The footpath is limited in width and sees significant pedestrian use due to the volume of people accessing the metro. The lack of adequate walking space and safe crossing points creates an unsafe environment for commuters moving between the metro, bus stops, and nearby commercial areas.

Existing Condition



Proposed Solution





6

Material Palette

6.1. Materials

6.1 Materials

Materials play an important role in deciding the usability of design. Good materials go hand-in-hand with the design and help achieve the intended purpose of various street elements. Material selection should be an on-going process through the different stages of design. To ensure appropriate budget allocation and longevity of street elements, it is important to select materials that are durable and easy to maintain.



Aundh D. P. Road, Pune

Materials used in the streets should be:

- Easy to install
- Easy to procure
- Durable
- Cost-effective in maintenance
- Easy to clean
- Easy to dismantle and repair
- Highly resistant to vandalism
- Slip resistant

6.1.1 Flooring Finish

There are three types of flooring finish:

- Unit paving - natural stone
- Unit paving - manufactured
- Cast-in-situ

Flooring finish should be selected such that it is adaptable to different weather conditions and suitable as per universal accessibility requirements.



Aundh D. P. Road, Pune

6.1.1.1 Unit paving - natural stone



S. M. Street, Kozhikode

Stone Blocks

Pros

- Highly durable, less prone to weathering; 80mm thick stone blocks can be used for bearing vehicular load as well
- Can be laid in variety of design patterns
- Easy to dismantle for future repairs

Cons

- Expensive; heavy to transport
- Results in uneven surface and sinking if sub-base is not prepared with care
- Prone to dismantling if kerbs are not installed properly

Application

On carriageways for slowing traffic, landscaped zones, shared streets, at entries for gates and ramps; avoided on footpath due to its highly undulated surface



Harrington Road, Chennai

Stone Slabs/Tiles

Pros

- Thicker slabs are durable; less prone to weathering
- Can also be used as cladding or seating to compliment the pavement finish

Cons

- Expensive and heavy
- Thinner slabs prone to breakage if mishandled or dropped
- Labour-intensive to install
- Slippery during rains if polished
- Results in uneven surface and sinking if sub-base is not prepared with care

Application

Sandblasted/leather finished stone on footpath - generally in select projects; not recommended on cycle tracks and load-bearing areas

Cement Tiles

Pros

- Cost-effective
- Lighter than stone tiles, stone/concrete pavers
- Available in different textures, colours, designs, patterns, and shapes

Cons

- Prone to breakage if mishandled or dropped
- More labour-intensive to install than PCC finish
- Slippery during rains if without anti-skid studs
- Results in uneven surface and sinking if the base is not prepared with care
- Prone to dismantling if moisture retains in the surface

Application

On footpaths, especially tactile flooring; not recommended on parking bays and cycle tracks



J. M. Road, Pune

6.1.1.2 Unit paving - manufactured

Concrete blocks

Pros

- Variety of sizes, colours, and patterns available
- Cost-effective
- Easier to install than stone slabs
- Anti-skid due to rough surface

Cons

- Results in uneven surface and sinking if the base is not prepared with care
- Un-chamfered edges may lead to chipping of blocks
- May become pigmented and slippery due to growth of moss on constant exposure to water

Application

On footpaths, parking bays, and carriageways to control speed; not recommended on cycle tracks



J.M. Road, Pune



J. M. Road, Pune

Permeable concrete blocks

Pros

- Offers a porous surface that enables water percolation
- Variety of sizes, colours, and patterns available
- Cost-effective
- Easier to install
- Anti-skid due to rough surface

Cons

- Improper composition of the material can result in loss of durability
- Requires regular cleaning to avoid blockage due to oil and dust
- Results in uneven surface and sinking if the base is not strong and stable

Application

On footpaths, parking spots, plazas.



Interlocking tiles

Pros

- Variety of sizes, colours, and patterns available
- Cost-effective
- Easier to install than stone slabs
- Anti-skid due to rough surface
- Easy to replace few tiles without removing all

Cons

- Results in uneven surface and sinking if the base is not prepared with care
- More labour-intensive to install than PCC finish
- Prone to dismantling if moisture retains in the surface
- May become pigmented and slippery due to growth of moss on constant exposure to water

Application

On footpaths and parking bays; not recommended on cycle tracks

6.1.1.3 Cast-in-situ

PCC Stamped Concrete

Pros

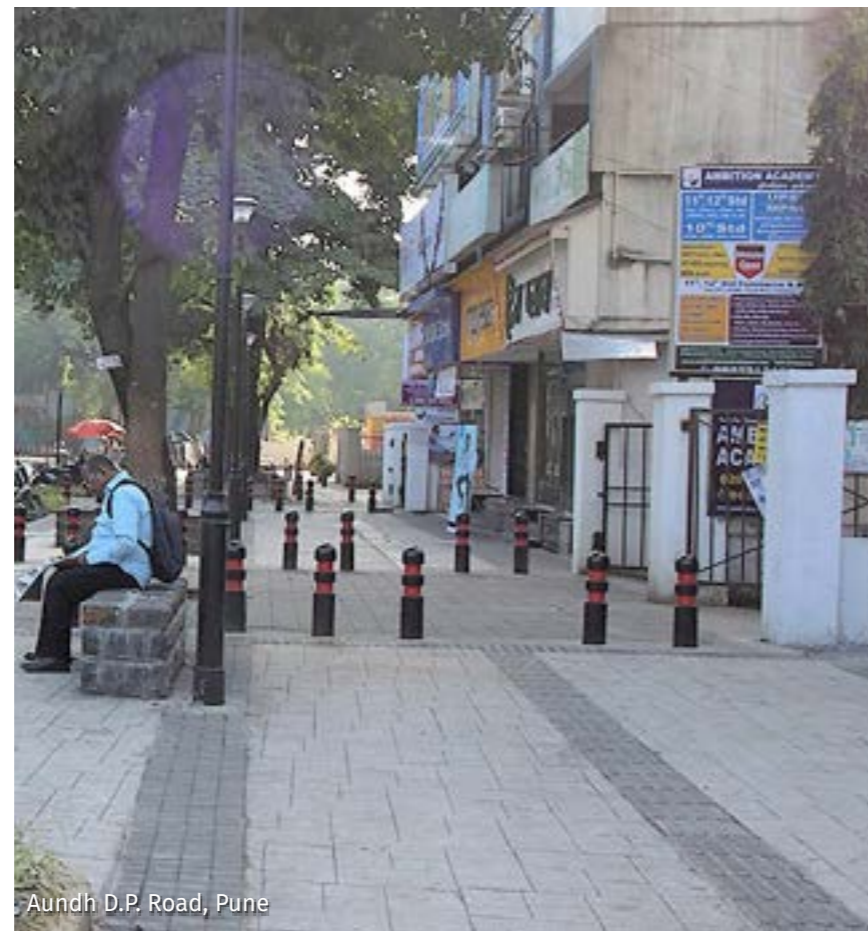
- Variety of stencils available
- Monolithic surface; does not start dismantling like pavers
- Uniform finish
- Easy to clean and maintain

Cons

- Stamping too deep may disrupt wheelchair movement
- Expansion joints should be provided to prevent cracking
- Has to be demolished in case of future repairs of underground utilities
- Need additional care during curing to avoid paw-prints

Application

On footpaths, landscaping, plazas; intricate stencils not recommended for cycle track

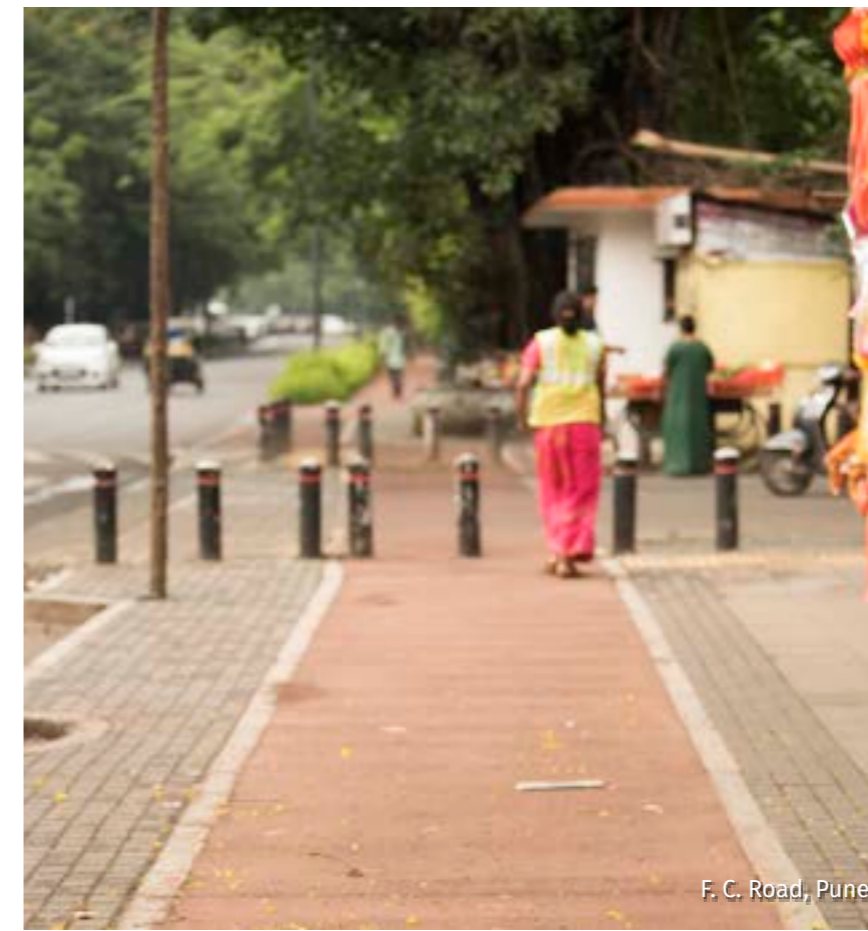


6.1.2 Cycle Track

The two of the most widely used materials for cycle tracks:

- Asphalt
- Concrete

When selecting materials for cycle tracks, factors such as climate, maintenance, and traffic load, play a major role. Cycle tracks should be colored to make them visually distinct from other street elements, ensuring clear visibility and safety for all road users.



Rubberised floor finish

Pros

- EPDM rubber surface helps in impact absorption
- Reduces the risk of permanent injury by cushioning the fall
- Highly durable, less prone to weathering
- Offers permeability
- Available as tiles, easy to install

Cons

- Comparatively expensive
- Seams are prone to vandalism and staining

Application

In play areas for children, on the footpaths

PCC Pigmented Concrete

Pros

- Adds colour to the street
- Can be combined with other finishes for variations in design
- Relatively quick to install
- Monolithic surface; does not start dismantling like pavers
- Uniform finish
- Easy to clean and maintain

Cons

- Colour wears off with time resulting in a dull look
- Expansion joints should be provided to prevent cracking
- Has to be demolished in case of future repairs of underground utilities
- Need additional care during curing to avoid paw-prints

Application

Generally used to differentiate between functions for instance pigmented concrete on cycle track

PCC broom finish

Pros

- Relatively quick to install
- Grooves provide sufficient grip
- Cheaper than other PCC finishes
- Monolithic surface; does not start dismantling like pavers
- Uniform finish

Cons

- Finish has to be even to avoid poor cycling experience
- Looks fairly plain
- Expansion joints should be provided to prevent cracking
- Has to be demolished in case of future repairs of underground utilities
- Need additional care during curing to avoid paw-prints

Application

On footpaths, cycle tracks, parking bays, and carriageways



Asphalt

Pros

- Smooth surface, providing a comfortable ride for cyclists.
- Quick to install and cost-effective compared to concrete.
- Flexible, reducing the risk of cracking under minor ground movements.
- Easy to repair and maintain.

Cons

- Less durable in extreme weather conditions (e.g., softens in heat, cracks in cold).
- Requires regular maintenance, especially in high-traffic areas.
- Non-permeable, which can lead to water logging during heavy rains.

Concrete (M30)

Pros

- Highly durable and long-lasting, suitable for heavy traffic and high-load areas.
- Resistant to weathering, including heat and UV radiation.
- Low maintenance once installed.
- Can be textured or colored for better visibility and aesthetics.

Cons

- Higher initial cost and longer installation time.
- Rigid surface can be uncomfortable for cyclists in case of falls.
- Prone to cracking if not designed properly (e.g., lack of expansion joints).
- Non-permeable, requiring proper drainage systems.

6.1.3 Bollards

There are four preferred types of materials used for bollards:

- Pigmented RCC
- Stone
- Galvanised iron
- Stainless steel

Bollard material should be robust for easy maintenance especially owing to high numbers.



Stone

Pros

- Durable

Cons

- Tends to break at the grooves
- Expensive



Pigmented RCC

Pros

- Pigment added to concrete mixture results in homogeneity, as opposed to painted bollard
- Cost-effective
- Lighter than stone bollards, making it easier to handle
- Can be cast in different shapes as per design

Cons

- Tends to chip off with time
- Lighter colours fade off with time leading to dull look

Galvanised iron

Pros

- Cost-effective compared to stone bollards
- Lighter than stone bollards, making it easier to handle
- Can be fabricated in different shapes as per design

Cons

- Paint tends to chip off
- More expensive than RCC bollards



Stainless steel

Pros

- Cost-effective compared to stone bollards
- Lighter than stone bollards, making it easier to handle
- Easy to clean and maintain due to smooth surface

Cons

- Limited in shape - generally available only as pipes
- Less aesthetical as compared to other types of bollards



Source: Wikimedia Commons

6.1.4 Seating

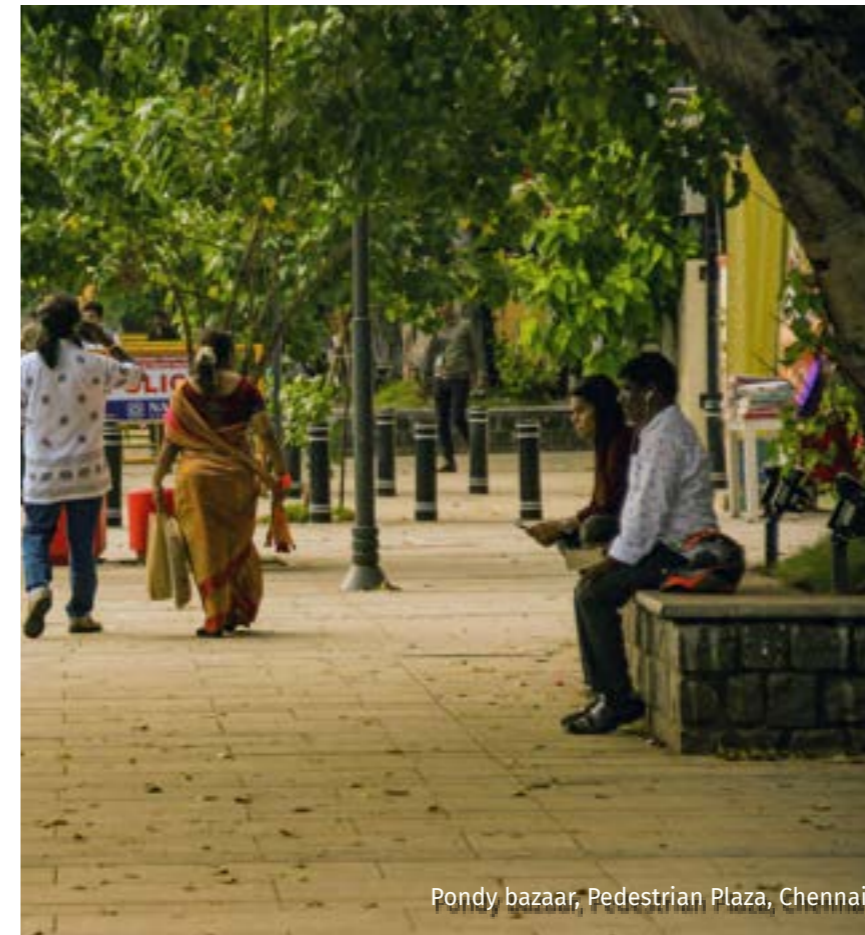
There are four preferred types of seating materials:

- Stone
- Precast concrete
- Metal
- Fibre reinforced polymers
-

Seating material should be selected such that it provides comfort in all weather conditions.



J. M. Road, Pune



Pondy bazaar, Pedestrian Plaza, Chennai



Pondy bazaar, Pedestrian Plaza, Chennai

Stone

Pros

- Highly durable, less prone to weathering
- Does not chip away easily

Cons

- Expensive
- Labour-intensive to install

Precast concrete

Pros

- Cost-effective
- Can be cast in different shapes as per design
- Pigmented concrete mixture results in homogeneity, as opposed to painted seats

Cons

- Tends to chip off with time
- If painted, colour chips off with time

Metal

Pros

- Can be fabricated with varying degrees of ornamentation - highly suited for traditional design themes
- Durable
- Less prone to weathering

Cons

- Becomes easily hot or cold depending on outside temperature, making it uncomfortable to use
- Hard and not comfortable to use for long - preferred to avoid squatters
- Paint tends to chip off
- Rusts with time
- Tends to be easy to steal



Source: Wikimedia Commons

Fibre reinforced polymers (FRP)

Pros

- Can be cast in different shapes as per design
- Pigment added to FRP mixture results in homogeneity, as opposed to painted seats
- Can be made translucent, providing for embedded lighting options
- Durable, being plastic in nature

Cons

- Expensive
- Relatively difficult to source, owing to fewer FRP vendors dealing with seating



6.1.5 Schedule of Rates

Schedule of Rates (SoR) provides standardised unit rates for materials, labour, and construction activities issued by the government or ULB.

Key Challenges & Considerations When Revising SoR & Designing Streets

- **Missing proposed design elements in SoR:** At times, Standard SoR items do not reflect the materials, detailing, or quality requirements of proposed street designs, leading to compromises or cost distortions.
- **Incorporating New Materials & Technologies:** Emerging elements such as modular pavers, compact utilities, smart poles, or advanced drainage systems require new rate items and specifications that are not yet included in current SoR lists.
- **Dynamic vs. Static Rate Structures:** Street design elements evolve quickly, while SoRs are updated annually, causing delays in adoption of innovative solutions and forcing reliance on non-scheduled items.
- **Institutional Coordination:** Effective revision requires alignment between multiple agencies—ULBs, Highways, utilities—so that common specifications and compatible rate items can be applied across projects.
- **Capacity Building:** Engineers, planners, and procurement teams need orientation on new materials, construction techniques, and quality benchmarks to ensure correct interpretation and implementation of updated SoR items.

Estimating Costs for Non-SoR Items

When a design element is not listed in the existing Schedule of Rates (SoR), its cost must be established through transparent and consistent market assessment:

- Collect a minimum of three quotations from authorised vendors or contractors to determine a realistic market rate.
- Document specifications clearly (material type, size, finish, installation method) to ensure comparable quotes.
- Use the average or the most reasonable quote—based on quality, warranty, and compliance—to estimate project costs.
- Submit these rates for approval as Non-Schedule Items (NSI) during DPR preparation or tendering.
- Recommend incorporation into the next SoR revision if the item is recurrent or essential, ensuring it becomes a standard approved item for future projects.

Recommended Frequency of Revision

- Annual major revision – once every year (mandatory)
- Mid-year minor corrections – once in 6 months (if market rates fluctuate >5–10%)
- Special revisions – when: New materials/tech are introduced | IRC standards or city street guidelines change | Policy mandates (e.g., green infrastructure, accessibility) change

From SoR to BOQ: How It Works

- BOQ (Bill of Quantities) uses these SoR items to calculate project-specific quantities and costs based on the approved street design and drawings.
- Designers and estimators map each design element's construction items (ex: footpath - Earthwork excavation, Cutting bituminous concrete/cement concrete surface etc.) to the closest relevant SoR item.
- If an element is not available in the SoR, it is added as a Non-SoR/NSI item, with rates determined as mentioned above.

The BOQ then lists: Item description (as per SoR/NSI) | Unit (sqm, rmt, nos., etc.) | Quantity (from drawings) | Rate (from SoR or NSI) | Amount (Quantity × Rate)

The final BOQ becomes the foundation for tendering, budgeting, and contract execution, ensuring transparency and uniformity.



7

Resource and References

Indian Roads Congress Guidelines ¹

The Indian Roads Congress (IRC) was set up by the Government of India in consultation with the State Governments in December, 1934 and is a registered society under the Registration of Society Act.



Following are the documents referred for this publication:

1. IRC:35-2015 Code of Practice for Road Markings
2. IRC:70-2017 Guidelines on Regulation and Control of Mixed Traffic in Urban Areas (First Revision)
3. IRC:86-2018 Geometric Design Standards for Urban Roads and Streets (First Revision)
4. IRC:92-2017 Guidelines for the Design of Interchanges in Urban Areas (First Revision)
5. IRC:98-2011 Guidelines on Accommodation of Utility Services on Roads in Urban Areas (Second Revision)
6. IRC:99-2018 Guidelines for Traffic Calming Measures in Urban and Rural Areas (First Revision)
7. IRC:SP:12-2015 Guidelines for Parking Facilities in Urban Roads” (First Revision)
8. IRC:SP:50-2013 Guidelines on Urban Drainage (First Revision)
9. IRC:67-2022 Code of Practice for Road Signs (Fourth Revision)
10. IRC:SP-110-2017 Application of Intelligent Transport System for Urban Roads
11. IRC:SP:111-2017 Capacity Building of Road Agencies In Charge of Implementation of Road Projects in Urban Areas
12. IRC:SP:117-2018 Manual on Universal Accessibility for Urban Roads and Streets
13. IRC:SP:118-2018 Manual for Planning and Development of Urban Roads and Streets
14. IRC:SP:119-2018 Manual of Planting and Landscaping of Urban Roads
15. IRC:SP:128-2020 Guidelines for Urban Road Manual
16. IRC:103-2022 Guidelines for Pedestrian Facilities (Second Revision)
17. IRC:11-2015 Recommended Practice for the Design and Layout of Cycle Tracks (First Revision)
18. IRC:SP-88- 2019 Manual on Road Safety Audit (First Revision)
19. Morth 250-2013 Specification for Road and Bridge Works
20. IRC: 65: 2017 Guidelines for Planning and Design of Roundabouts
21. IRC:SP: 32 Road Safety Manual For Schools
22. IRC: SP: 42 Guideline for Road Drainage
23. IRC SP 90: 2010 Manual for Grade Separator and Elevated Structures
24. IRS 37: 2018 Guidelines for the Design of Flexible Pavements (Fourth Revision)
25. IRC 58: 2015 Guidelines for the Design of Plain Jointed Rigid Pavements for Highways (Fourth Revision)

Harmonised Guidelines & Standards for Universal Accessibility in India 2021 ²

The Harmonised Guidelines 2021 intend to be used as a reference for various stakeholders of built environment including the State Governments, the Development Authorities, the Planning Organisations, and Private Sector. The Harmonised Guidelines for Universal Accessibility shares a vision for a universally accessible and inclusive India.



The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 ³

Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 is an Act of the Parliament of India. This Act was drafted with the legislative intent of protecting the livelihood rights of street vendors as well as regulating street vending through demarcation of vending zones and laying out conditions/restrictions for street vending.



Motor Vehicles Act ⁴

The Motor Vehicles Act, 1988 is an Act of the Parliament of India, which regulates all aspects of road transport vehicles. The Act came into force from 1 July 1989.

The Act provides in detail, the legislative provisions regarding licensing of drivers/ conductors, registration of motor vehicles, control of motor vehicles through permits, special provisions relating to State Transport Undertakings, traffic regulation, insurance, liability, offences, and penalties, etc.



Disabilities Act ⁵

The Rights of Persons with Disabilities Act fulfils the obligations to the United National Convention on the Rights of Persons with Disabilities (UNCRPD), to which India is a signatory.

The guidelines, prepared by the Ministry of Urban Development are comprehensive guidelines, inclusive of all provisions updated and harmonised to act as an easy reference to Practitioner’s Guide for Barrier Free Designs.



The National Urban Transport Policy (April 2006) ⁶

It was approved by the Government of India to tackle urban mobility issues. It provides for integrated land use and transport plans in cities, coordinated planning for urban transport, people oriented equitable allocation of road space, capital support in the form of equity participation and/or viability gap funding, innovative financing, dedicated urban transport funds, NMT, car restraint measures, clean fuel and vehicle technology, private sector participation, and pilot projects in cities to establish models of best practices.



UTTIPEC Guidelines for Street Design ⁷

As per the recommendations of National Urban Transport Policy, DDA, Delhi has notified Unified Traffic and Transportation Infrastructure (Plg. & Engg.) Centre (UTTIPEC) to enhance mobility, reduce congestion, and to promote traffic safety by adopting standard transport planning practices.

Recently UTTIPEC has published street design guidelines to promote sustainable transportation system in the city of Delhi.



Global Street Design Guide, NACTO ⁸

Originally a program of NACTO, the Global Designing Cities Initiative (GDCI) was founded in 2014 by Janette Sadik-Khan, operating under the guidance of Director Skye Duncan.

The Global Street Design Guide is supporting practitioners to redefine the role of streets in cities around the world. Created with the input of experts from 72 cities in 42 countries, the Guide offers technical details to inform street design that prioritizes pedestrians, cyclists, and transit riders.



The Sponge Handbook: Chennai ⁹

The Sponge Handbook: Chennai is designed to be a guiding document to align regional planning priorities and neighbourhood planning processes with the hydrological cycle of Chennai's basins.

The handbook uses the Buckingham Canal area to demonstrate how the Sponge Basin framework can lead to the re-imagination of urban neighbourhoods, transit stations, open spaces, streets, and the rejuvenation of multi-functional infrastructures like the canal itself.



Streets for Pandemic Response & Recovery NACTO ¹⁰

This resource aggregates and synthesizes emerging practices in transportation and street design in response to the COVID-19 pandemic. It highlights cities' current efforts to re-organize streets to best manage this crisis and support economic recovery. This evolving resource is not a comprehensive list of options, nor is it calibrated for the needs of a specific community; every city should assess local context and need, as well as the trajectory of the pandemic in the community, to inform a response and implementation strategy.



Urban Street Design Guidelines ¹¹

Pune has developed 'Urban Street Design Guidelines' to ensure that appropriate street types and design elements are implemented to create better streets for people. The Urban Street Design Guidelines give an overview of various elements that go into designing streets making them universally accessible, and also provide standard templates for different sizes and uses of streets. It provides a mandate for PMC engineers and planners for designing and executing streets to meet local needs, avoiding a one-size-fits-all approach.



Street Design Guidelines for Bhubaneswar, 2021 ¹²

The Street Design Guidelines for Bhubaneswar intend to provide a step-by-step approach to formulating a Complete Street. Designing for Complete Streets is an exercise that acknowledges the needs and limitations of each user group and their interaction with the others. This manual gives guidelines regarding the designing of street for appropriate allocation of spaces and general specifications for various elements of the street. It is recommended to refer to IRC guidelines for technical engineering aspects regarding technology and construction procedure.



Designing Streets for Kids

This document by the Global Designing Cities Initiative, captures international best practices, strategies, programs, and policies that cities worldwide have used to design spaces that enable children of all ages and abilities to utilise cities' most abundant asset – streets. The guide includes design recommendations and case studies that highlight streets that are safe, enjoyable, and inspirational for children and caregivers.



Building Neighbourhoods to Thrive In - Design Guidelines

The Bernard van Leer Foundation (BvLF), the Ministry of Housing and Urban Affairs and the National Institute for Urban Affairs in India, and BDP, one of Europe's largest interdisciplinary design-led firms have compiled a series of five publications that will help Smart Cities in India to create infant, toddler and caregiver (ITC)-friendly neighbourhoods. This document looks at key features of pedestrian-oriented public spaces and offers insights into what ITCs need from those features.



Integrating Safety into Road Design

This global document published by the World Bank provides guidance on safety-related issues for street design in urban and rural settings, especially for low and middle-income countries (LMICs) around the world. Referencing this document will help the reader understand the nuances of road safety and how these can be applied in the context of school zones.



West Avenue, Chennai

